FIVE-YEAR REVIEW REPORT

Third Five-Year Review Report
for
The Tinkham Garage Superfund Site
Town of Londonderry
Rockingham County, New Hampshire

March 2009

Prepared By:

United States Environmental Protection Agency
Region 1

Boston, Massachusetts

Approved by:

James T. Owens, III
Director, Office of Site Remediation and Restoration

Date:
March 24, 2009

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LIST OF ACRONYMS AND ABBREVIATIONS

1,2-DCE	Cis-1,2-dichloroethylene
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COCs	Contaminants of Concern
COPC	Contaminants of Potential Concern
EPA	United States Environmental Protection Agency
FS	Feasibility Study
MCLs	Maximum Contaminant Levels
MCLG	Maximum Contaminant Level Goals
MDL	Method Detection Limit
MNA	Monitored Natural Attenuation
NHDES	New Hampshire Department of Environmental Services
NPL	National Priorities List
OHM	Oil and/or Hazardous Material
OMM	Operations and Maintenance Manual
OU	Operable Unit
ppm	Parts per million
ppb	Parts per billion
POTW	Publicly Owned Treatment Works
PRP	Potentially Responsible Party
PQL	Practical Quantitation Limit
PSD	Performing Settling Defendant
QAPP	Quality Assurance Project Plan
RA	Remedial Action
RAO	Remedial Action Objectives
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semivolatile organic compounds
TCE	Trichloroethene
VOCs	Volatile Organic Compounds

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EXECUTIVE SUMMARY

The Third Five Year Review report for the Tinkham Garage Superfund Site (the Site) in Londonderry, Rockingham County, New Hampshire was completed to evaluate the implementation of the selected remedy in order to determine whether the remedy remains protective of human health and the environment.

The source control component of the remedy was completed in 1995. Since that time, the groundwater remedy component has been ongoing. In 2003, an Explanation of Significant Difference (ESD) was completed by EPA which changed the groundwater remedy to Monitored Natural Attenuation (MNA) and institutional controls. Since the last five year review, volatile organic compound (VOC) concentrations in groundwater have shown an overall decrease. At many of the monitoring wells, the Maximum Contaminant Levels (MCLs) have been achieved and concentration trends indicate that MCLs will be achieved in many of the source area monitoring wells within the 15 years predicted (2018 from the cessation of pumping in 2003) in the 2003 ESD. Concentrations of VOCs have not been detected in groundwater from monitoring wells that define the boundaries of the Groundwater Management Zone (GMZ). The GMZ is the area established under a New Hampshire Department of Environmental Services (NHDES) Groundwater Management Permit. The Groundwater Management Permit for the Site was renewed on November 27, 2007 and will remain in place until groundwater is restored to drinking water standards.

In January 2008, NHDES Waste Management Division changed the Groundwater Management Permit's analytical requirements to include 1,4-dioxane. This compound had not been investigated as part of any of the Site investigations performed historically by the EPA or the PRPs. As a result of the testing performed in 2008, 1,4-dioxane is now considered a contaminant of concern at the Site and a work plan to more fully assess the nature and extent of this contaminant will be developed and implemented in 2009. No risk to public health or the environment appears to be posed by 1,4-dioxane since the contaminant appears to be confined to the area where groundwater use restrictions are in place and municipal water is used exclusively. 1,4-dioxane is a contaminant not known to have an impact on vapor intrusion.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Tinkham Garage		
EPA CERCLIS ID: NHD062004569		
Region 1	**State:** NH	**City/County:** Londonderry/Rockingham
SITE STATUS		
NPL Status: X Final Deleted Other (Specify)		
Remediation Status (choose all that apply): Under Construction Operating XComplete		
Multiple OUs? Yes X No		**Construction Complete Date:** 4/7/1995
Has site been put into reuse? X Yes No		
REVIEW STATUS		
Lead Agency: X EPA State Tribe Other Federal Agency		
Authors Names: Byron Mah		
Authors' Titles/Affiliation: Remedial Project Manager, U.S. EPA – Region 1 – New England		
Review Period: 11/10/08 to 2/28/09		
Date(s) of Site Inspection: 11/10/2008		
Type of Review: X Post-SARA Pre-SARA NPL-Removal Only Non-NPL Remedial Action Site NPL State/Tribe Lead Regional Discretion		
Review Number: 1 (first) 2 (second) **X 3 (third)** Other (specify)_____		
Triggering Action: Actual RA Onsite Construction at OU# 1 (NTCRA) Actual RA Start at OU #_____ Construction Completion X Previous Five-Year Review Report		
Triggering Action date (from WasteLAN): 3/31/2004		
Due Date (five years after triggering action date): 3/31/2009		

FIVE-YEAR REVIEW SUMMARY FORM, CONT'D.

Issues:

Five conditions require further assessment over the next five years:

1. Increasing VOC concentration trends in groundwater have been observed at bedrock monitoring well FW11D. At this time, the cause of the increasing VOC concentration trend in FW11D is unknown.
2. Some VOC concentrations in groundwater in select monitoring wells are decreasing at a slower rate than predicted.
3. The detection of 1,4-dioxane in the groundwater in 2008 needs to be further assessed. Prior to 2008, 1,4-dioxane was not tested for and its extent and potential impact on the remedy is currently unknown. Additional data is needed to determine nature and extent of contamination.
4. EPA's knowledge of vapor intrusion continues to evolve and additional assessment of the indoor air vapor intrusion pathway may be required. Based on updated risk based screening values, existing overburden data does not have low enough detection limits to confirm the findings of the 2004 vapor intrusion screening analysis.
5. Many of the wells are antiquated and are open borehole and do not provide detailed information about contaminated fracture zones. Concentrations remain high especially at FW21D. Given that this is an open borehole well, it is possible that there is a highly contaminated fracture that is averaged out and that a full understanding of the extent of the plume is not entirely understood.

Recommendations and Follow-up Actions:

1. Revise and Implement the monitoring program with special attention to FW11D. Also, Increase groundwater monitoring frequency to twice per year for monitoring wells NAI-K2, FW11D, and FW20 and add nitrate, sulfate, ferrous iron, total iron, chloride, ethane, ethane, and methane to the analytical testing parameters to better evaluate geochemical conditions.

2. Update Groundwater Model to reflect any changed cleanup time predictions.

3. A work plan to assess the extent of 1,4-dioxane in groundwater shall be developed and implemented.

4. Collect overburden groundwater data, develop and implement a vapor intrusion screening analysis to confirm the results of the 2004 screening.

5. Develop work plan to address additional data needs related to open borehole well locations

Protectiveness Statement(s):

The remedy at the Tinkham Garage Superfund Site is protective in the short term because institutional controls remain are in place to prevent use of and exposure to contaminated groundwater. Vapor intrusion has been prevented by the installation of Sub-Slab Depressurization Systems SSDS in the new housing development, and an initial screening level vapor intrusion analysis was performed in 2004 which indicated that vapor intrusion was not a concern based on the 2002 EPA Draft Guidance. However, in order for the remedy to be protective in the long-term, the following actions need to be performed to ensure long term protectiveness: revise the monitoring program to include additional work to address increasing well contaminant concentrations, update groundwater model, develop and implement a work plan to determine the nature and extent of the 1,4-dioxane contamination, collect overburden groundwater data, develop and implement an updated vapor intrusion screening analysis, and develop and implement a work plan to address additional data needs related to open borehole well locations.

Other Comments:

There are no other comments for this 5-Year Review.

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1.0. INTRODUCTION

The purpose of a five-year review is to determine whether a remedy at a Superfund site is protective of human health and the environment. The methods, findings. and conclusions of a review are documented in a Five-Year Review report. In addition, Five-Year Review reports identify issues, if any, and recommendation(s) necessary to address them.

The U.S. Environmental Protection Agency (EPA)-Region I is preparing this Five-Year Review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121(c) states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the Site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such Site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.

The Agency interpreted this requirement further in the NCP; 40 CFR §300.430(f)(4)(ii) states:

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

The EPA - Region I has conducted a five-year review of the remedial actions implemented at the Tinkham Garage Superfund Site (the Site) in Londonderry, Rockingham County, New Hampshire (Figures 1a and 1b). This review was conducted for the entire Site from November 2008 through February 2009. This report documents the results of the review. Roux Associates, Inc. (Roux Associates), under contract as consultants to the Cannons

Engineering Sites Group (Potentially Responsible Parties - PRPs), has provided technical input and summary analysis of the data evaluated for this Five-Year Review Report.

This is the third Five-Year Review Report for the Site. The triggering action for this policy review is the signature date of the previous Five-Year Review Report, March 31, 2004.

2.0 SITE CHRONOLOGY

The chronology of events for the Tinkham Garage Superfund Site is presented in Table 1 below:

Table 1 Site Chronology

Date	Event
April, 1978	Discovery of the problem
January, 1983	Condominium and individual residential wells shut down
September 8, 1983	Final listing on NPL
November, 1983	Water line installed
September 30, 1986	RI/FS completed
September 30, 1986	ROD signature
September 11, 1987	Administrative Order on Consent requiring PRPs to perform pre-design studies to assess source control remedial technologies
July, 1988	Pre-Design Study completed
March 10, 1989	Amended ROD changing source control remedial technologies
August 14, 1989	Consent Decree requiring PRPs to implement amended ROD remedy
January 21, 1992	ESD addressing on-site groundwater treatment
March 1993	Sewer line construction starts
April 7, 1994	Construction start - Remedy
November 28, 1994	Start of source control and groundwater treatment plant operation
April 7, 1995	Preliminary Close Out Report - Construction completion – Remedy
November 1995	Vacuum extraction system dismantled
July, 1996	Bedrock extraction wells shut down
March 31, 1999	First five-year review report
October 30, 2002	NHDES issues Groundwater Management Zone Permit
November, 2002	All extraction wells shut down
March 31, 2003	ESD documenting groundwater remedy change to natural attenuation
March 2004	Second five-year review report
November 27, 2007	NHDES issues renewal of the Groundwater Management Zone Permit

3.0 BACKGROUND

3.1 Physical Characteristics

The Tinkham Garage Superfund Site (the Site) situated in Londonderry, New Hampshire, is approximately one mile southwest of the intersection of interstate Route 93 and state Route 102. It is bounded by state Route 102 to the north, Gilcreast Road to the east, Ross Drive to the south and the Woodland Village Condominium complex to the west. The Site includes various developed areas. Undeveloped land features include wooded areas, open fields and wetlands. Since the last five-year review, a residential development (active senior housing) is currently being constructed over the center of the Site. The residential development will consist of about 165 retirement homes. Currently, approximately 400 people reside within a condominium complex on the western boundary of the Site. Additional residences include private, one-family homes to the north.

The topography of the Site is relatively flat with surface drainage from north to south. An unnamed tributary and an attached intermittent stream branch through the condominium complex and discharge off-site to Beaver Brook south of Ross Drive. In turn, Beaver Brook discharges to the Merrimack River farther to the south. The 100 year floodplain on the Site extends from Route 102 and follows the unnamed tributary along to its confluence with Beaver Brook. The floodplain is generally 100 feet wide along its path through the condominium complex. This area forms an approximately two acre wetland. Beyond the Site boundaries, south of the condominium complex, and before the tributary's confluence with Beaver Brook, the flood plain widens considerably forming a sixty-six acre wetland. In addition, there is a fifty-seven acre wetland at the southeast corner of the Site.

3.2 Land and Resource Use

The Site encompasses 375 acres of residential, commercial and undeveloped land. In addition to the Woodland Village Condominium complex, there are single family homes along Mercury and McAllister Drives in the northern portion of the Site, and along Gilcreast Road and Ross Drive bordering the southern boundary of the Site. The Tinkham Realty office and Tinkham Garage are located in the northeastern portion of the Site. In 2003, Home Depot, Staples, 99 Restaurant, and Dunkin' Donuts completed construction of a retail facility on the northeastern portion of the Site.

In January 2003, Gilcreast Realty Holdings II, LLC purchased the 95-acre area in the central portion of the Site for development into active senior housing called The Nevins. The Nevins

Retirement Cooperative Association owns the land upon which individually owned residential structures have been constructed. As of February 2009, approximately 126 homes have been completed with over 50% owned presumed to be occupied. The developer has a prospective purchaser agreement with EPA. The benefits and obligations of which have been assigned to the Nevins Retirement Corporation Association. Per discussions with EPA, these homes were originally constructed without basements and had subslab depressurization systems (SSDS) installed. Around 2005, EPA assented to the developer to change their designs to include basements in homes with SSDS installed based on the assessment that as long as SSDS were in place, basements could be constructed.

Prior to the installation of a permanent waterline to the area in 1983, the primary source of drinking water was the bedrock aquifer. The groundwater flow in bedrock appears to take place largely in fracture zones which have a northeast/southwest orientation. Groundwater in bedrock discharges to the unnamed tributary on-site from both east and west of the tributary. Additionally, there exist several artesian bedrock wells along Mercury Drive and within the condominium complex. Groundwater discharging to the surface from these wells migrates to the unnamed tributary via surface flow.

3.3 History of Contamination

It is believed that waste disposal took place at the Tinkham Garage during 1978 and 1979. In April of 1978, complaints of foam and odors occurring in a small unnamed brook which crosses Ross Drive led representatives of the Londonderry Health Department to investigate the Site. Their investigation concluded that liquids and sludge from tank truck washings had been dumped behind Tinkham Garage directly to the ground surface. A subsequent citizen complaint to the New Hampshire Water Supply and Pollution Control Commission (NHWSPCC, now New Hampshire Department of Environmental Services (NHDES)) resulted in an order to remove surface contamination. Additionally, a trench was excavated to divert surface run-off from behind the garage area away from Ross Drive.

3.4 Initial Response

In January of 1983, the drinking water supply well servicing Londonderry Green Apartments (currently Woodland Village Condominiums) and residential wells along Mercury and McAllister Drives were taken out of service because of documented or potential organic contamination. The Site was finalized on the NPL in September 1983. The EPA temporarily supplied water until a permanent water line was installed by NHWSPCC under a cooperative agreement between the state and the EPA in November of 1983.

3.5 Basis for Taking Action

The conclusions of the remedial investigation of the Site, as described in the 1986 ROD, indicate that VOCs were the predominant contaminants of concern and presented the major risk to public health and welfare and the environment.

VOCs were detected in soil in four areas within the Site and in both the overburden and bedrock groundwater aquifers. In the overburden, the VOCs in groundwater were found to be migrating in a south-southwesterly direction and discharging to the surface water of the unnamed tributary and the wetlands area to the south of Tinkham Garage. In addition, slight downward gradients resulted in VOCs entering the bedrock aquifer. Once in the bedrock aquifer, migration of VOCs was found to be primarily controlled by the alignment of the water bearing fracture sets which are oriented in a northeast to southwest direction based upon two pump tests. The alignment of the fracture sets indicated that it was unlikely that VOCs in the bedrock aquifer would reach the private water supply wells located along Ross Drive to the South of the Site. The absence of Site-related VOC contamination along Ross Drive was confirmed by monitoring performed by NHDES until 2006.

VOCs were also detected in surface water and corresponding sediment samples in areas of groundwater discharge including the unnamed tributary and the attached intermittent stream which flow through the condominium complex, and the wetland areas to the south of Tinkham Garage.

A risk assessment was completed as part of the remedial investigation. The risk assessment identified that VOCs in groundwater posed the greatest potential for risk at the Site. The risk posed by soil was predominantly limited to the potential for VOCs in soil to continue to contribute to contamination of the groundwater. Contaminants that were detected in onsite surface waters and associated sediments were concluded not to pose a significant risk to public health and welfare and the environment.

4.0 REMEDIAL ACTIONS

4.1 Remedy Selection

The remedial action objectives were presented in the Record of Decision (ROD), issued September 30, 1986, for source control and management of migration response alternatives and were developed to mitigate existing and future potential threats to public health and the environment.

The remedial action objectives for source control are:

- Mitigating further release of contaminants to the surrounding environmental media; and
- Eliminating or minimizing the threat posed to public health, welfare and the environment from the source area.

The remedial objectives for management of migration are:

- Mitigating further migration of contaminants beyond their current extent; and
- Eliminating or minimizing the threat posed to public health, welfare and the environment from the current extent of contaminant migration.

To meet these objectives, the ROD included the following components:

- Excavation of contaminated soils with onsite treatment;
- Removal of contaminated groundwater from the overburden and bedrock aquifers with off-site treatment at the Derry wastewater treatment facility which may be preceded by on-site pretreatment, with monitoring; and
- Development of legislation by the Town of Londonderry, New Hampshire and/or the State of New Hampshire which prevents the present and future use of the on-site aquifer.

Based on conclusions presented in the July 1988 Pre-Design Study Report, EPA issued an Amended ROD for the Site on March 10, 1989, which changed the source control remedial technology to vacuum extraction. This amendment further specified that the management of migration remedy would extract contaminated, deep groundwater from two of the Woodland Village Condominium wells, LGAW and LGSW, as well as the contaminated shallow groundwater from the vacuum extraction process. The contaminated shallow groundwater pumped during the vacuum extraction remediation was to be treated on-site before being mixed with the water from the condominium wells and conveyed via a sewer to the Derry wastewater treatment facility.

Problems arose concerning funding of the sewer, so EPA issued an Explanation of Significant Difference (ESD) on January 21, 1992, which allowed for the on-site treatment of all contaminated groundwater. Before that remedial component could be implemented, however, the sewer was funded and completed allowing the amended ROD remedy to be accomplished. This was documented in a second ESD issued on March 31, 2003, which retracted the first ESD. In addition, the 2003 ESD determined that, after several years of active groundwater extraction and treatment, natural attenuation could achieve the objectives of the management of migration remedy. Furthermore, the 2003 ESD established that the use of a New Hampshire Groundwater Management Permit satisfied the institutional control requirements of the ROD to prevent present and future use of the on-site aquifer.

4.2 Remedy Implementation

Following issuance of the 1986 ROD, EPA negotiated an administrative order on consent in September 1987 which required the PRPs conduct to a Pre-Design study. The results of this study were presented in the Pre-Design Study Report issued in July 1988. Based on conclusions presented in the July 1988 Pre-Design Study Report, EPA issued an Amended ROD for the Site in March of 1989.

A Consent Decree which, in part, required the PRPs to implement the remedial action, was entered by the District Court and became effective on August 14, 1989. Following entry of the Decree, the PRPs began the remedial design and planning for remedial action.

Implementation of the remedy required off-site treatment of extracted groundwater at the Derry wastewater treatment facility. Conveyance of extracted groundwater to the Derry wastewater treatment facility required construction of a new sewer line between the Site in Londonderry and the wastewater treatment facility located just over the town line in Derry (a total distance of about one mile). Responsibility for construction of the sewer line was assigned to the Site owner under the Consent Decree. The Site owner partnered with a local developer who planned to construct the sewer line as part of a public/private construction project planned by Londonderry. As a municipal project, the sewer line was designed with a capacity to serve existing and planned residential and commercial needs, in addition to the extracted groundwater from the Site. Construction of the sewer line began in March of 1993.

The vacuum extraction system was designed and constructed and began operation in November of 1994. In addition to soils treatment, groundwater extraction from both the shallow and bedrock aquifers was also initiated. Bedrock groundwater was extracted from two former supply wells, LGAW and LGSW, and was conveyed back on-site via a dedicated sewer line. Shallow groundwater was extracted through the vacuum extraction wells and was pretreated on-site. The bedrock and shallow groundwater was then mixed and the combined flow was discharged to the Derry wastewater treatment facility through the newly constructed municipal sewer.

Analytical results confirmed that the vacuum extraction system achieved the soil remediation goal of total VOCs less than 1 mg/kg in September of 1995. In November of 1995, the vacuum extraction system was dismantled and the shallow groundwater extraction system was modified to operate independently via six shallow extraction wells. Pre-treatment was also discontinued at this time since contamination levels in the extracted groundwater were less than the influent limits imposed by the wastewater treatment facility.

A temporary shutdown of the two bedrock groundwater extraction wells was granted in July of 1996 since sampling indicated that contaminants had achieved steady-state conditions in LGSW, LGAW and other bedrock monitoring wells located throughout the Site. Monthly monitoring of VOC levels in wells LGSW and LGAW was performed from July 1996 through February 2001. VOC levels in both wells, and other bedrock monitoring wells throughout the Site, remained statistically constant, further supporting the conclusion that a steady-state condition was present in the bedrock. Furthermore, sampling results documented evidence of active bioremediation and assessment of the data indicated that natural attenuation would attain groundwater remediation goals in the shallow aquifer within a 15 year period.

4.3 2003 Explanation of Significant Difference

In May 1997, two years after initiation of active groundwater extraction and consistent with the Amended ROD, the PRPs requested EPA evaluate the permanent shutdown of the complete groundwater extraction system based on evidence of natural attenuation in the shallow aquifer and attainment of steady-state conditions in the bedrock aquifer.

In the Quarter 9 monitoring report (dated July 31, 1996), the PRPs reported substantial evidence of natural attenuation through intrinsic bioremediation in the shallow aquifer. More specifically:

a. high dissolved oxygen levels were recorded in areas with reduced VOC levels;
b. electron receptors including ferric iron and sulfate were present;
c. the range of pH levels were favorable for microbial growth;
d. elevated levels of dissolved hydrocarbon gases indicated dechlorination reactions were occurring;
e. significantly high microbial plate counts were consistently found throughout the plume area; and
f. a two dimensional groundwater flow and transport model predicted that MCLs would be attained throughout the shallow plume within a 15 year period (2018).

In March 2003, EPA issued an ESD to the 1986 ROD, the 1989 Amended ROD, and the 1992 ESD for the Tinkham Garage Site. Specifically, the 2003 ESD documented the following changes:

- Modification of the groundwater remedy from active extraction to natural attenuation;
- Clarification of the type of institutional controls necessary for the groundwater remedy; and
- Retraction of the 1992 ESD to reflect the actual approach for the discharge of treated groundwater used at the Site.

Based upon a review of the monitoring data and the supporting documentation provided by the PRPs, EPA and NHDES agreed with the recommendation that the active groundwater extraction system be discontinued. This decision was based on the following considerations outlined in the March 2003 ESD:

1. Steady-state conditions exist in the condominium area bedrock aquifer;
2. Active natural attenuation of the remaining VOC contamination is occurring in the former source area;
3. Further migration of VOC plumes in the shallow or bedrock aquifer beyond their current extent is highly unlikely;
4. Natural attenuation of contaminants in the shallow aquifer will attain the clean-up objectives established in the 1986 ROD; and
5. Institutional controls have been established and will remain until such time as groundwater is restored to a condition that allows for unrestricted use.

Currently, groundwater monitoring is performed to demonstrate that the VOC plumes are not expanding and that natural attenuation is occurring in accordance with the Groundwater Management Permit issued by NHDES. If these monitoring results demonstrate migration of the shallow or bedrock plume beyond its current extent, or indicate active natural attenuation is no longer present or no longer adequate to achieve remedial goals, EPA, in consultation with NHDES, may modify this decision and require active extraction or other reasonable actions to attain the required remedial goals. As we near the 2018 estimated completion, it is becoming apparent that a number of wells might not achieve the cleanup goals within that time frame. It would be prudent to revisit the groundwater model to accurately predict the cleanup time frame.

Institutional controls to prevent the ingestion of contaminated groundwater remain necessary until such time as groundwater is restored to drinking water standards. Currently, no one is known to be consuming the contaminated groundwater. Public water was extended to all impacted residents in 1983.[1] A figure (from Town of Londonderry) is attached that shows that the entire area that is within the GMZ and beyond is serviced with municipal water. These residents continue to have public water available as their primary drinking water source and other domestic uses. On October 30, 2002, NHDES issued Groundwater Management Zone permit number GWP-199004008-L-001 to the PRPs. Properties owners located within the Groundwater Management Zone (GMZ) do not use groundwater are tied into the municipal water and do not use groundwater. There is no one known to be consuming the contaminated groundwater and having this groundwater for any domestic uses such as showering, bathing, using dish/clothing washing. This permit was renewed on November 27, 2007. The permit requires that groundwater monitoring of key monitoring wells and two surface water sampling locations are sampled on a combination of semi-annual and annual basis.

4.4 System Operation / Operation and Maintenance

Operation of the monitored natural attenuation remedy includes sampling of monitoring wells. Periodic maintenance and inspection of monitoring of wells is performed by the PRP's contractor. PRP's contractor also inspects wells for ensure that they are locked and secured. There have been no major operation and maintenance issues. The contractor costs to sample and maintain wells ranges from $15,000 to $25,000 per year.

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[1] Impacted residents were located on Mercury Drive and McAllister Drive and at the Woodland Village Condominium Complex located west of the former source area.

5.0 PROGRESS SINCE THE LAST REVIEW

The last Five-Year Review was completed in March 2004. The 2004 Five-Year Review contained three recommendations for ensuring the protectiveness of the remedy. A summary of the recommendations from the 2004 Five-Year Review and actions implemented to date are shown in Table 2. The 2004 Five- Year Review's protectiveness statement is a s follows: Because the remedial actions being implemented throughout the Tinkham Garage Superfund Site are protective, the site is protective of human health and the environment.

Table 2: Actions Taken Since the Last Five-Year Review

Recommendations from the Last Five-Year Review	Actions Implemented Since Last Five-Year Review
1. The monitoring program should be continued with careful consideration given to the data obtained for NAI-K2 and NAI-M1 so that an assessment of the reasons behind the increased concentrations of VOCs can be made.	1. Concentrations of total VOCs in the groundwater from these monitoring wells have been lower in each sampling round since 2003. While a general downward trend of total VOC concentrations appears apparent in monitoring wells NAI-K2 and NAI-M1, the concentrations in the May 2008 sampling round were higher than previous sampling rounds.
2. A monitoring program designed to assess the impact of TCE vapors on the health of existing residents near contaminated shallow groundwater should be developed and implemented. If unacceptable levels are found, mitigation methods would then need to be evaluated and implemented.	2. The potential for indoor air impacts at existing residents was assessed using existing data and additional investigations in 2004. No unacceptable conditions were identified and, therefore, no mitigation methods were required at the time. However the assessment of vapor intrusion has changed since the 2004 assessment. New data will be needed to confirm the vapor intrusion findings from the 2004 screening. See additional discussions below.
3. To avoid the potential for TCE vapors to adversely impact health of future residents living in homes above the contaminated groundwater, the developer of the homes will incorporate mitigation measures into their design	3. In February 2004, EPA met with the developer and it was agreed that all homes would be constructed with subslab depressurization systems. All new construction homes within the Nevins development are constructed with SSDS.

In 2004, EPA approved a three part assessment of the potential impact of VOC vapors in indoor air at the Site:

a. Compare groundwater monitoring results for the previous 10 years to the EPA <u>Draft Guidance for Evaluating the Vapor Intrusion to indoor Air Pathway from Groundwater and Soils</u> (November 2002) (Vapor Intrusion Guidance);

b. Collect and test groundwater sample from existing well FW-05 to assess the potential for the indoor air pathway in the Mercury Drive area using the EPA <u>Draft Guidance for Evaluating the Vapor Intrusion to indoor Air Pathway from Groundwater and Soils</u>; and;

c. Install an overburden monitoring well in the Mercury Drive area to collect and test the overburden groundwater for the presence of VOCs.

Based upon the groundwater testing results, it was concluded that, per the 2002 EPA Draft Vapor Intrusion Guidance, no further investigations were conducted in the Woodland Village Condominium area. These conclusions were documented in a letter dated May 20, 2004 to EPA from the PRPs and was supported by the Vapor Intrusion Guidance screening checklist and the chemical testing results. A copy of this letter is included in Appendix A.

It was also determined that further assessment of the vapor intrusion pathway was required for the Mercury Drive area. The scope of the further assessment was determined at a meeting between EPA and the PRPs in February 2005. As a result of these further investigation activities it was determined that VOCs were not detected in the overburden groundwater in the Mercury Drive area and, therefore, no further vapor intrusion investigations of vapor intrusion were required. These results are also included in Appendix A. However, since the initial vapor intrusion screening analysis was performed in 2004, more comprehensive approaches were developed to evaluate vapor intrusion. These new approaches are more conservative than provided for in the 2002 EPA Draft Guidance. An evaluation of the data used for the 2004 screening analysis was performed, however the detection limits used in the analysis of the groundwater are higher than the levels required for the current vapor intrusion screening level analysis.

6.0 FIVE-YEAR REVIEW PROCESS

6.1 Administrative Components

The Remedial Project Manager, Mr. Byron Mah, conducted the Tinkam Garage Superfund Site Five-Year Review with assistance from Mr. Thomas Andrews, NHDES Project Manager, and Roux Associates, consultant to the PRPs. The Five-Year Review consisted of:

- Reviewing relevant documents listed in the reference section of this document;
- Conducting a review and technical assessment of data collected during implementation of the selected remedy, and
- Performing interviews and a Site inspection.

6.2 Community Notification and Involvement

No public meetings are required and, therefore, none were held regarding the Five-Year Review for this Site. However, the EPA did publish a notice regarding the initiation of the Five-Year Review in the local newspaper, the Derry News, on November 27, 2008 noting that the Five-Year Review process will be completed and publicly available in March 2009. A copy of the public notice is included in Appendix B.

6.3 Document Review

This Five-Year Review consisted of a review of relevant documents including monitoring data. The 2003 Explanation of Significant Differences and the Amended Record of Decision were also consulted. A reference section is provided at the end of this Five-Year Review Report.

6.4 Site Inspection

Mr. Mah (EPA), Dr. Michael Walters (PRP Committee Representative) and Mr. Ian Phillips (Roux Associates) conducted a Site visit on November 10, 2008. The former source area and the surrounding properties within the groundwater management zone were visually inspected. No unusual or problematic issues were observed.

The Site inspection activities are documented in a checklist included as Appendix C.

6.5 Interviews/Meeting

EPA had a telephone interview with Mr. David Caron, Administrator, Town of Londonderry on February 17, 2009. The town did not express any concerns with regards to the site or EPA remedy currently in place.

EPA also had a telephone interview with Thomas Andrews, Project Manager, New Hampshire Department of Environmental Services (NHDES) on February 12, 2009. Mr. Andrews indicated that the Groundwater Management Permit remains in effect and that no one is using groundwater from the Site as they are all tied in to municipal water.

6.6 Risk Information and ARARs Review

Data analyzed in Appendix E indicate no change in Site conditions which would warrant a re-evaluation of risk. However, the recent detection of 1,4-dioxane in groundwater in 2008 does warrant further assessment to verify that a complete exposure pathway does not exist to private water supply wells outside of the GMZ. EPA has not established a Maximum Concentration Level (MCL) for 1,4-dioxane. The NHDES Ambient Groundwater Quality Standard (AGQS) for 1,4-dioxane is 3 ug/L. 1,4 dioxane has been detected in concentrations as high as 350 ug/l.

EPA has endorsed the State Comprehensive Groundwater Protection Program embodied in RSA 485C. New Hampshire law holds that all groundwater should be drinking water quality. The exception is for areas in which GMZ permits have been issued to address contamination and, in that case, the purpose of the permit is to regulate the restoration of the aquifer to drinking water quality. The GMZ permits establish areas within which it is acknowledged that groundwater is contaminated above drinking water standards and is permitted to be established where municipal water is supplied to prevent the use of groundwater for any purpose. Within a GMZ, actions are required to eventually return groundwater to drinking water standards. The original groundwater management permit for the Site was issued by NHDES in October 2002. Recently, .NHDES issued a renewal permit on November 27, 2007.

6.7 Data Review

Table 3 presents the groundwater monitoring results from all wells sampled at the Site from 2002 through 2008. For comparison purposes, Table 4 presents the 1997 groundwater monitoring results from the same monitoring wells. Figures 2a/b and 3a/b show the concentration of total VOCs in overburden and bedrock groundwater, for May 1997 and May 2007-2008 respectively.

As shown in Figures 2a/b, VOCs in overburden groundwater extend for approximately 600 feet from the source area to the unnamed tributary to the south-southeast. A comparison of Figures 2a/b indicates that the shape of the VOC plume is generally consistent over the past twelve years and that the magnitude of VOC concentrations within the plume has decreased by 3.7 times, however VOC's at NAI-K2 increased 2.4 times from 1997 to 2008. MCLs have not been achieved in this area.

As shown in Figures 3a/b, VOCs in bedrock groundwater extend for approximately 3,000 feet from the source area to the unnamed tributary and the Woodland Village Condominium complex to the southwest. A comparison of Figures 3a/b indicates that the shape of the VOC plume is generally consistent over the past twelve years with the exception of FW11D. Over this time period, total VOC concentrations have remained generally consistent, although still high in concentration.

In general, data from each of the monitoring wells indicate that VOC concentrations in groundwater have already met the MCLs at many locations. Visual inspections and/or the Mann-Kendall statistical tests of VOC concentration trends (**Appendix E**) in a number monitoring wells with current exceedences indicate that concentrations at these locations are generally decreasing. Some of the wells, but not all of the wells may reach the MCLs within the 15 year prediction presented in the 2003 ESD.

The groundwater monitoring results at FW11D have shown an increasing concentration trend over the past five years. At this time, the cause of the increasing VOC concentration trend in FW11D is unknown. No new releases of VOCs are known to have occurred at the Site. The increasing concentrations trends could be the result of disturbances to the source area by the redevelopment of the property in 2002, however further study is required to determine the cause of the increases. Following the redevelopment of the property in 2002, increases in VOC concentrations were observed in two source area monitoring wells, NAI-K2 and NAI-M1. VOC concentrations in groundwater at NAI-K2 and NAI-M1 have shown a downward trend since the post-redevelopment concentrations measured in 2003.

Due to changes in NHDES requirements regarding 1,4-dioxane, this new contaminant of concern has been added to the monitoring program at the Site. The detection of 1,4-dioxane in two rounds of sampling in 2008 has resulted in 1,4-dioxane being considered a contaminant of concern at the Site. Currently, the detection of 1,4-dioxane is restricted to within the GMZ but further assessment is warranted. Please see Figure 1,4-dioxane detects for well locations where 1,4-dioxane was detected.

No detectable concentrations of VOCs, including 1,4-dioxane in 2008, in groundwater have been measured in the monitoring wells intended to represent the boundaries of the GMZ during the past five years.

Surface water has been collected as part of the monitoring program. There is no impact to surface water from the groundwater from the Site.

An updated Conceptual Site Model for the Site based upon historic and current data is included in Appendix F.

7.0 TECHNICAL ASSESSMENT

7.1 Question A: Is the remedy functioning as intended by the decision documents?

Yes. Since the last five year review, VOC concentrations in groundwater have shown an overall decrease. At many of the monitoring wells, the MCLs have been achieved and concentration trends indicate that MCLs will be achieved in most of the source area monitoring wells within the 15 years (2018) predicted in the 2003 ESD. Monitoring wells that establish the boundaries of the Site and the GMZ (FW28D, ERT04, and FW25) continue to have no detectable concentrations of VOCs. The Groundwater Management Permit uses these wells as their compliance wells.

The institutional controls to prevent the use of contaminated groundwater remain in effect through the November 27, 2007 Groundwater Management Permit approved by NHDES. In addition, as required by the prospective purchaser agreement with Gilcreast Realty Holdings II, LLC, as assigned to the Nevins Retirement Cooperative Association, property deeds prohibit the use of groundwater for drinking water purposes. Property owners located within the Groundwater Management Zone (GMZ) do not use groundwater as municipal water is connected. Currently, no one is known to be consuming the contaminated groundwater since everyone in the general area are all on municipal water.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Yes. Current data indicate that conditions at the Site do not warrant a re-evaluation of risk.

In 2008, 1,4-dioxane was detected in groundwater at the Site greater than the NHDES Ambient Groundwater Quality Standards (AGQS) of 3 ug/l and will need to be further assessed relative to potential exposures to private water supply wells in the area. Groundwater samples collected from FW28D, one of the boundary monitoring wells between the source area and Ross Drive, did not have detectable concentrations of 1,4-dioxane. Ross Drive is not part of the Site, and is not part of the Groundwater Management Zone. There is no data indicating that contaminated groundwater has migrated outside of the GMZ. Furthermore, the results of hydrogeologic investigations performed at the Site have indicated that any contaminants in the bedrock would migrate in the bedrock fractures approximately parallel to Ross Drive and are unlikely to impact private water supply wells along Ross Drive.

The potential for risk associated with indoor air exposure pathways (vapor intrusion) was preliminarily assessed in 2004 and determined not to be a concern at the Site using available guidance at the time. However, since the initial vapor intrusion screening analysis was performed in 2004, more comprehensive approaches were developed to evaluate vapor intrusion. These new approaches are more conservative than provided for in the 2002 EPA Draft Guidance. An evaluation of the data used for the 2004 screening analysis was performed; however the detection limits used in the analysis of the groundwater are higher than the levels required for the current vapor intrusion screening level analysis. Current data with lower detection limits are needed to perform this analysis. For screening, EPA uses risk-based levels that are associated with a 1E-6 target cancer risk or a target non-cancer hazard quotient of 0.1. The risk-based groundwater screening levels for a target cancer risk of 1E-6 are 1.4ppb for benzene, 2.3 ppb for 1,2-dichloroethane, 0.5ppb for vinyl chloride, 2.9ppb for TCE, and 0.6ppb PCE.

Furthermore, EPA worked closely with the developers of the senior residential development that is currently being constructed over the center of the Site. EPA and NHDES have required the developer to include subslab depressurization systems as part of the construction.

Surface water samples have been collected 20 times since the last five year review was completed. During that time, only one time was a contaminant detected in excess of the New Hampshire Water Quality Criteria for Toxic Substances (WQTS). In May 2005, trichloroethene was detected at a concentration of 3 ug/l, in excess of the WQTS of 2.7 ug/l. Since then, there have been no surface water contamination detected.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

Yes. The extent of 1,4-dioxane needs to be assessed to determine whether a complete exposure pathway exists to private water supply wells immediately beyond the GMZ. Vapor intrusion evaluation is an evolving science and requires that lower detection limits be used at the screening level to determine whether vapor intrusion be of concern.

8.0 ISSUES

Five conditions require further assessment over the next five years:

1. Increasing VOC concentration trends in groundwater have been observed at bedrock monitoring well FW11D. At this time, the cause of the increasing VOC concentration trend in FW11D is unknown.
2. Some VOC concentrations in groundwater in select monitoring wells are decreasing at a slower rate than predicted.
3. The detection of 1,4-dioxane in the groundwater in 2008 needs to be further assessed. Prior to 2008, 1,4-dioxane was not tested for and its extent and potential impact on the remedy is currently unknown. Additional data is needed to determine nature and extent of contamination.
4. EPA's knowledge of vapor intrusion continues to evolve and additional evaluation of the indoor air vapor intrusion pathway may be required. Existing overburden data does not have low enough detection limits in order to perform a vapor intrusion screening analysis utilizing updated risked-based screening values.
5. Many of the wells are antiquated and are open borehole and do not provide detailed information about contaminated fracture zones. Concentrations remain high especially at FW21D. Given that this is an open borehole well, it is possible that there is a highly contaminated fracture that is averaged out and that a full understanding of the extent of the plume is not entirely understood.

Table 5 Issues

	Issue	Currently Affects Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
1	Increasing VOC concentration trends in FW11D	N	Y
2	Degradation rate of some VOCs slower than predicted	N	N
3	The extent and potential impact of 1,4-dioxane is unknown	N	Y
4	Based on updated risk based screening values, existing overburden data does not have low enough detection limits to confirm the findings of the 2004 vapor intrusion screening analysis.	N	Y
5	Open borehole wells provide minimal information	N	Y

9.0 RECOMMENDATIONS AND FOLLOW-UP ACTIONS

To assess the issues identified above, the following recommendations are proposed:

Table 6 Recommendations / Follow-up Actions

Issue	Recommendations / Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
1	Revise and Implement the monitoring program with special attention to FW11D. Also, Increase groundwater monitoring frequency to twice per year for monitoring wells NAI-K2, FW11D, and FW20 and add nitrate, sulfate, ferrous iron, total iron, chloride, ethane, ethane, and methane to the analytical testing parameters to better evaluate geochemical conditions.	PRPs	EPA/ NHDES	Semi-annually beginning in May 2009	N	Y
2	Update Groundwater Model to reflect any changed cleanup time predictions.	PRPs	EPA/ NHDES	Submit Work Plan by November 2009	N	N
3	Develop and implement a work plan to assess the nature and extent of 1,4-dioxane contamination in groundwater.	PRPs	EPA/ NHDES	Submit Work Plan by June 2009	N	Y
4	Collect overburden groundwater data, Develop and implement a vapor intrusion screening analysis.	PRPs	EPA/ NHDES	Submit Work Plan by June 2009	N	Y
5	Develop and implement work plan to address additional data needs related to open borehole well locations	PRPs	EPA/NH DES	Submit Work Plan by June 2009	N	Y

10.0 PROTECTIVENESS STATEMENT(S)

The remedy at the Tinkham Garage Superfund Site is protective in the short term because institutional controls remain are in place to prevent use of and exposure to contaminated groundwater. Vapor intrusion has been prevented by the installation of Sub-Slab Depressurization Systems SSDS in the new housing development, and an initial screening level vapor intrusion analysis was performed in 2004 which indicated that vapor intrusion was not a concern based on the 2002 EPA Draft Guidance. However, in order for the remedy to be protective in the long-term, the following actions need to be performed to ensure long term protectiveness: revise the monitoring program to include additional work to address increasing well contaminant concentrations, update groundwater model, develop and implement a work plan to determine the nature and extent of the 1,4-dioxane contamination, collect overburden groundwater data, develop and implement an updated vapor intrusion screening analysis, and develop and implement a work plan to address additional data needs related to open borehole well locations.

11.0 NEXT REVIEW

This Site requires on-going, policy, five-year reviews. The next review will be conducted and issued in March 2014, five years from the date of signature of this report.

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FIGURES

Unlabeled Figures

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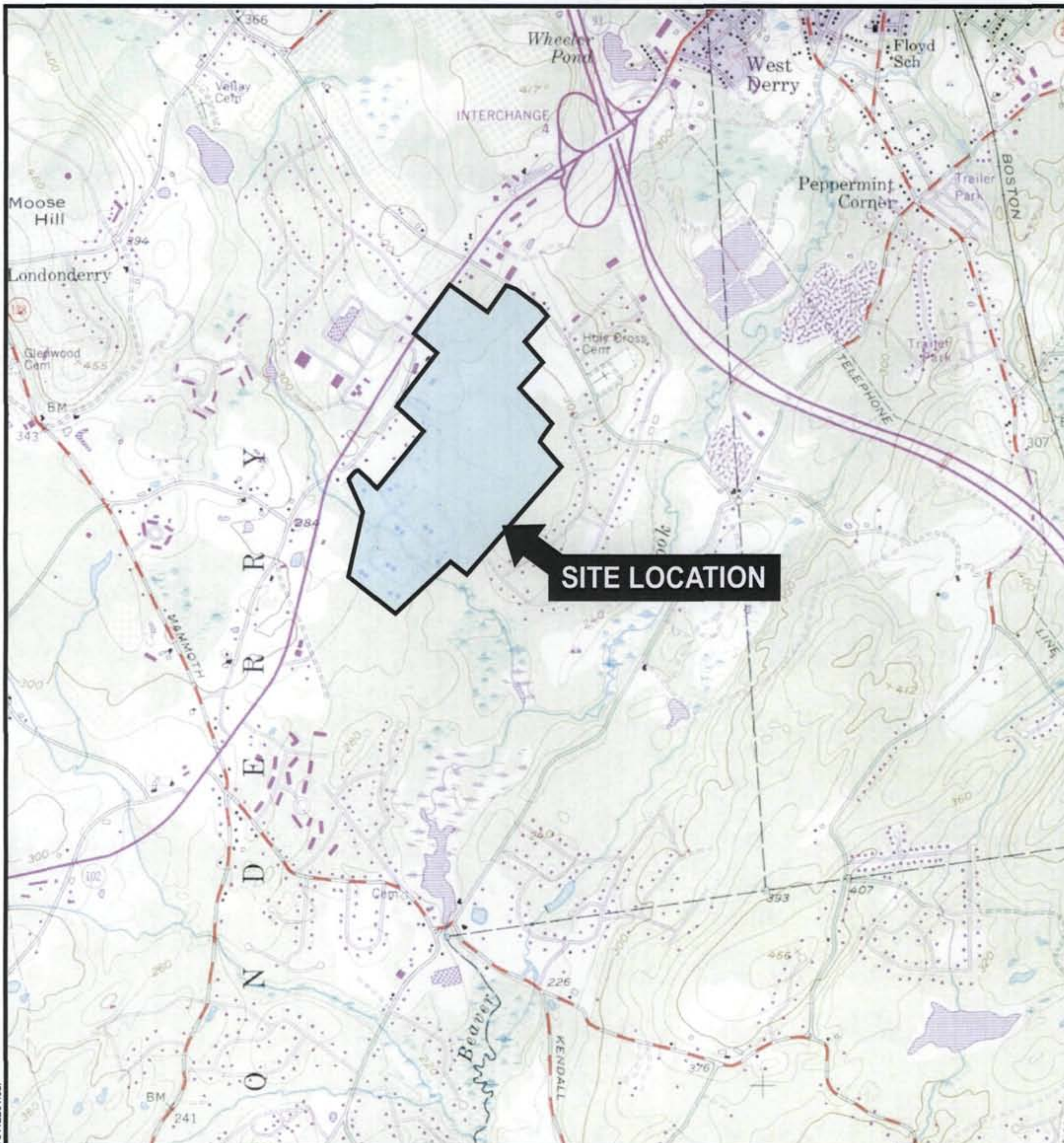

■ QUADRANGLE LOCATION

N

SOURCE:
USGS; Windham, New Hampshire
7.5 Minute Topographic Quadrangle

Title:

SITE LOCATION MAP

CANNONS ENGINEERING - SITE TECHNICAL COMMITTEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared for:

CANNONS ENGINEERING

ROUX ROUX ASSOCIATES, INC. *Environmental Consulting & Management*	Compiled by: KS	Date: 1/26/09	FIGURE
	Prepared by: CRS	Scale: NTS	1a
	Project Mgr.: IP	Office: MA	
	File No.: CSG70112201	Project No.: 111701M	

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LEGEND:

GROUNDWATER MANAGEMENT ZONE (GMZ)

MAP REFERENCE:

1. GEI CONSULTANTS, INC. DRAWING ENTITLED, "2002 ANNUAL MONITORING REPORT TINKHAM GARAGE SITE LONDONDERRY, NEW HAMPSHIRE GROUNDWATER MANAGEMENT ZONE". FIGURE 2, FEBRUARY 2003.

800' 0 800'

Title:

GROUNDWATER MANAGEMENT ZONE

CANNONS ENGINEERING – SITE TECHNICAL COMMITEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared For: CANNONS ENGINEERING

ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: KS	Date: 1/26/09	FIGURE
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	Project Mgr: IP	Office: MA	
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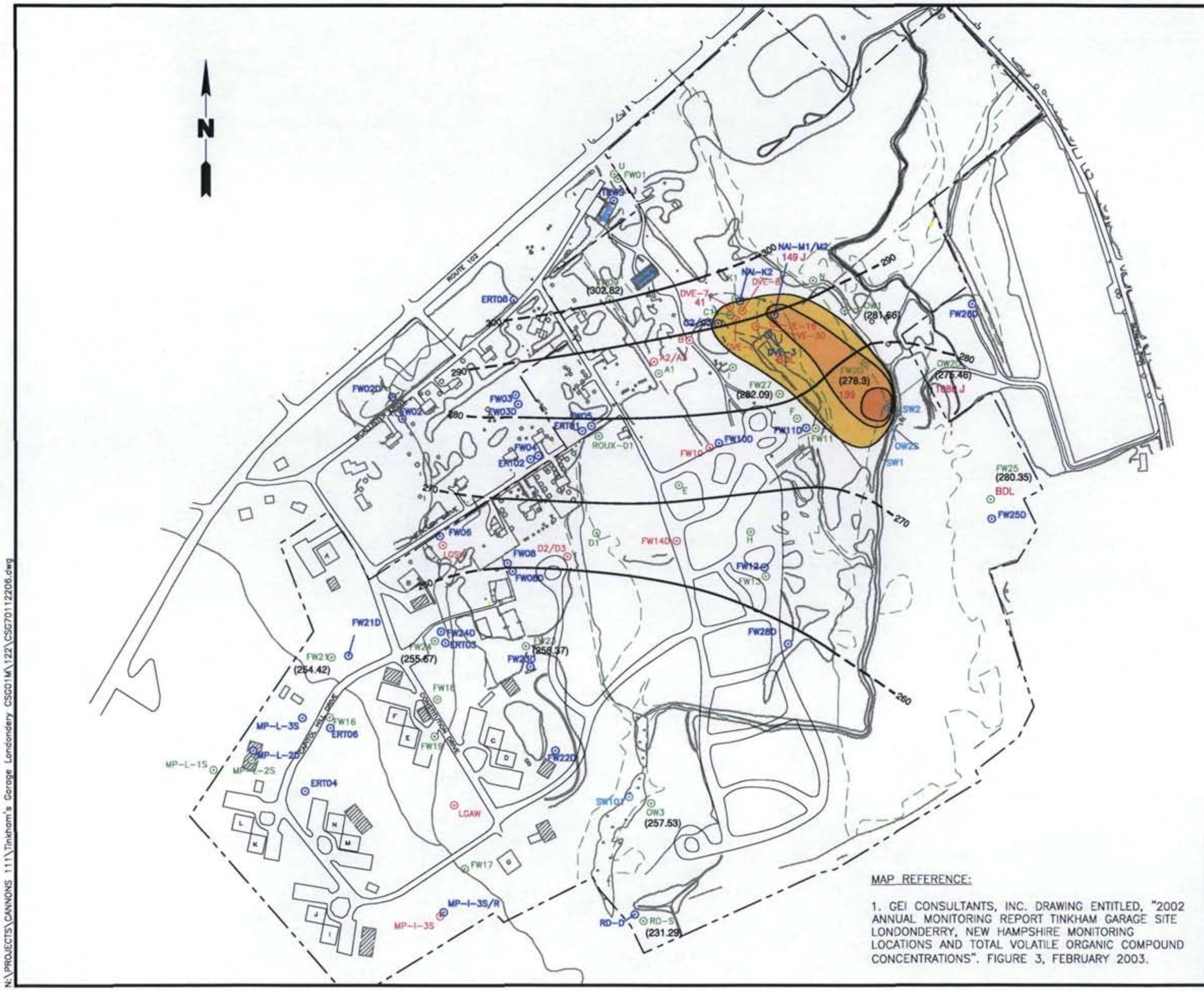

MAP REFERENCE:

1. GEI CONSULTANTS, INC. DRAWING ENTITLED, "2002 ANNUAL MONITORING REPORT TINKHAM GARAGE SITE LONDONDERRY, NEW HAMPSHIRE MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATIONS". FIGURE 3, FEBRUARY 2003.

LEGEND:

- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- EXISTING MONITORING WELL NOT MONITORED
- APPROXIMATE SURFACE WATER SAMPLING LOCATION
- FORMER CONSOLIDATED SOILS SOURCE AREA
- WOODLAND VILLAGE CONDOMINIUMS
- LEACHFIELDS FOR CONDOMINIUMS
- STREAM
- EDGE OF WETLAND
- SWAMPY AREA
- TREELINE
- 260 — OVERBURDEN GROUNDWATER ELEVATION CONTOUR (IN FEET)
- (232.19) OVERBURDEN GROUNDWATER ELEVATION (IN FEET)
- 1080 J TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATION µg/L
- J = ESTIMATED VALUE
- BDL = BELOW DETECTION LIMITS

TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATIONS

- 10µg/L – 100µg/L
- 100µg/L – 1000µg/L
- >1000µg/L

NOTE:

1997 DATA PRESENTED ONLY FOR WELLS ALSO SAMPLED IN 2008.

400' 0 400'

Title:

MAY 1997 OVERBURDEN GROUNDWATER ELEVATIONS AND TOTAL VOC CONCENTRATIONS

CANNONS ENGINEERING – SITE TECHNICAL COMMITTEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared For: CANNONS ENGINEERING

ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: KS	Date: 2/27/09	FIGURE
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	Project Mgr: IP	Office: MA	
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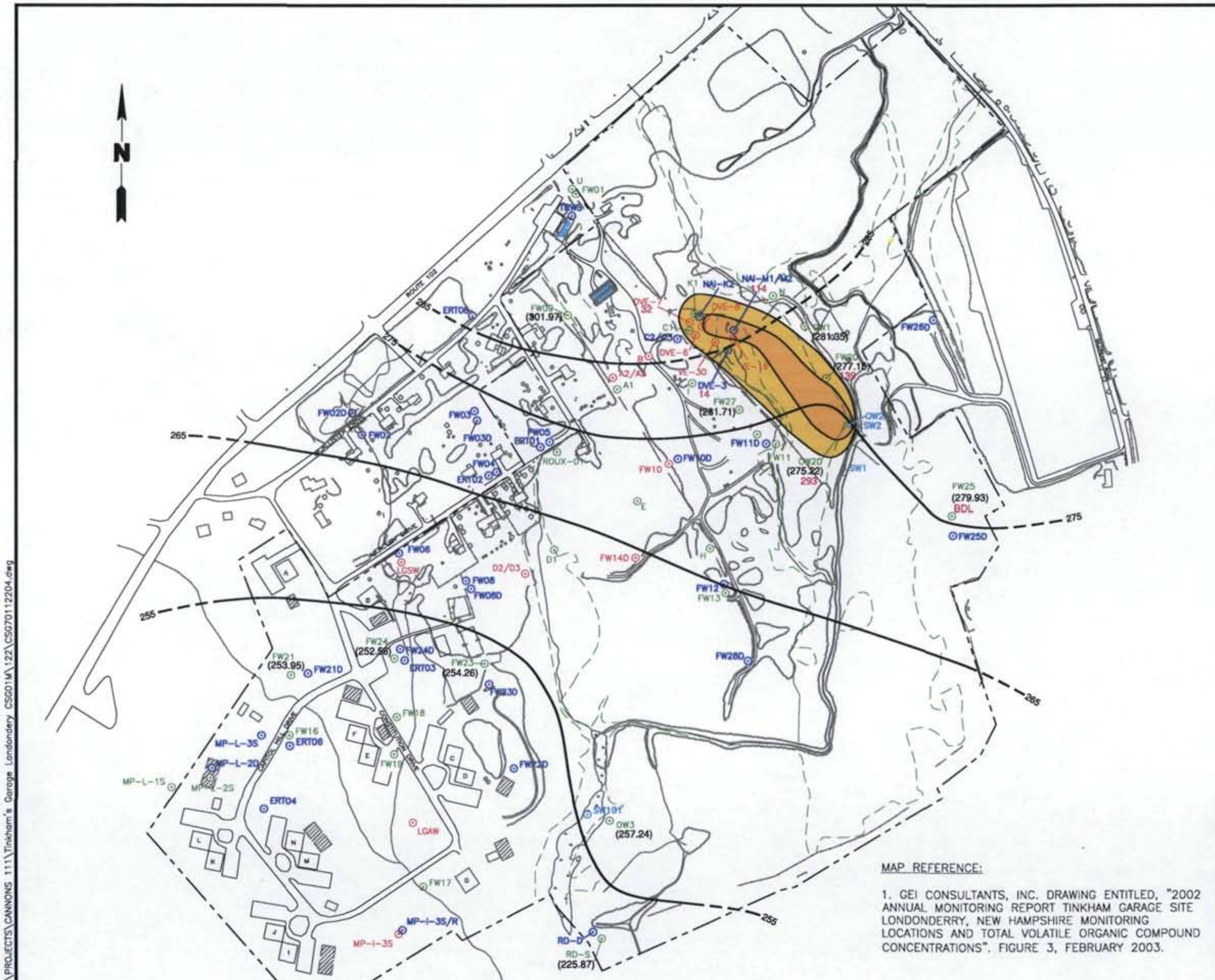

LEGEND:

- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- EXISTING MONITORING WELL NOT MONITORED
- APPROXIMATE SURFACE WATER SAMPLING LOCATION
- FORMER CONSOLIDATED SOILS SOURCE AREA
- WOODLAND VILLAGE CONDOMINIUMS
- LEACHFIELDS FOR CONDOMINIUMS
- STREAM
- EDGE OF WETLAND
- SWAMPY AREA
- TREELINE
- 275 — OVERBURDEN GROUNDWATER ELEVATION CONTOUR (IN FEET)
- (275.22) OVERBURDEN GROUNDWATER ELEVATION (IN FEET)
- 293 TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATION µg/L
- J = ESTIMATED VALUE
- BDL = BELOW DETECTION LIMITS

TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATIONS

- 10µg/L – 100µg/L
- 100µg/L – 1000µg/L
- >1000µg/L

400' 0 400'

MAP REFERENCE:

1. GEI CONSULTANTS, INC. DRAWING ENTITLED, "2002 ANNUAL MONITORING REPORT TINKHAM GARAGE SITE LONDONDERRY, NEW HAMPSHIRE MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATIONS". FIGURE 3, FEBRUARY 2003.

Title:
MAY 2007 OVERBURDEN GROUNDWATER ELEVATIONS AND MAY 2008 TOTAL VOC CONCENTRATIONS

CANNONS ENGINEERING – SITE TECHNICAL COMMITTEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared For: CANNONS ENGINEERING

ROUX ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: KS	Date: 2/27/09	FIGURE
	Prepared by: CRS	Scale: AS SHOWN	2b
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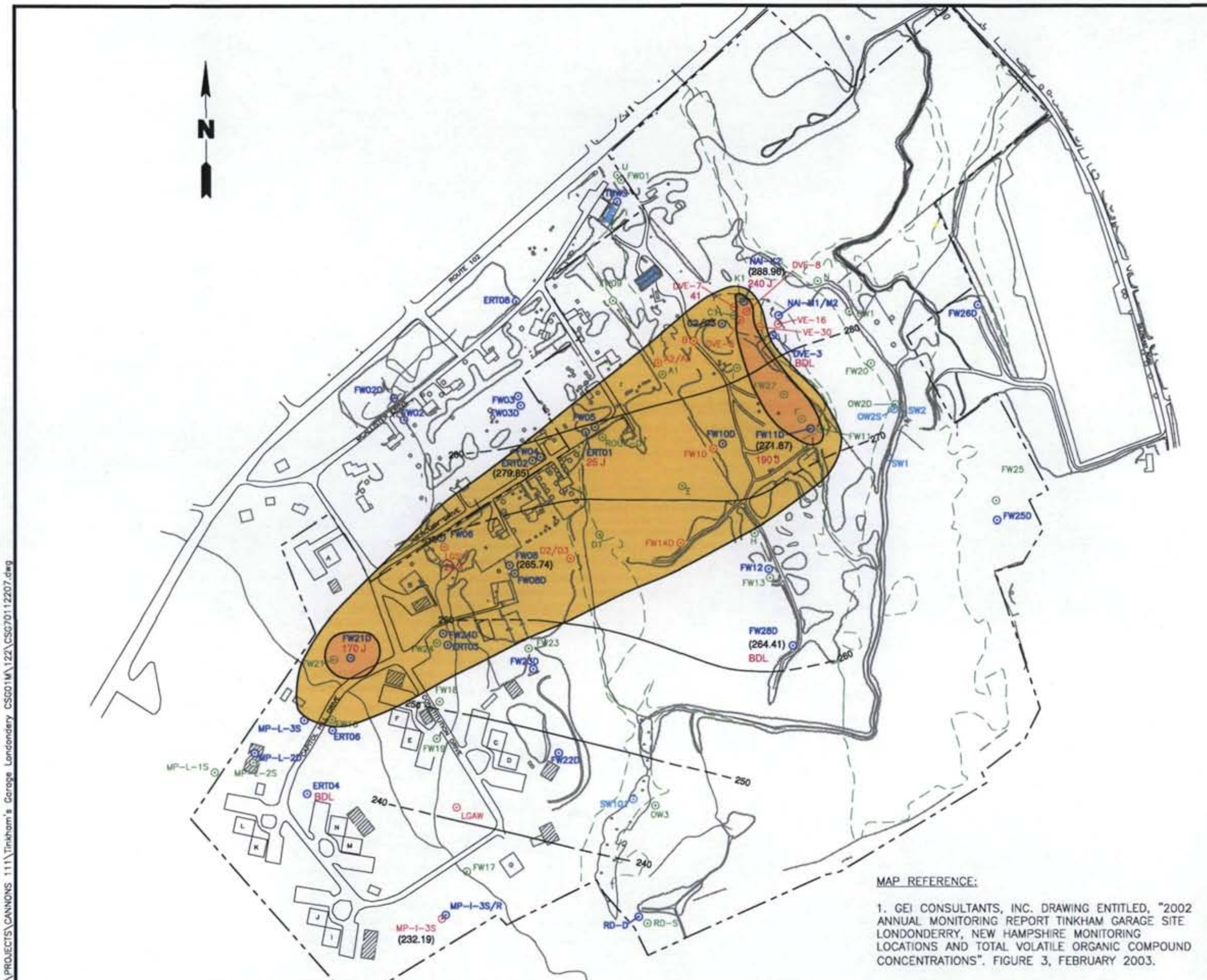

LEGEND:

- BEDROCK MONITORING WELL
- OVERBURDEN MONITORING WELL
- EXISTING MONITORING WELL NOT MONITORED
- APPROXIMATE SURFACE WATER SAMPLING LOCATION
- FORMER CONSOLIDATED SOILS SOURCE AREA
- WOODLAND VILLAGE CONDOMINIUMS
- LEACHFIELDS FOR CONDOMINIUMS
- STREAM
- EDGE OF WETLAND
- SWAMPY AREA
- TREELINE
- 260 — BEDROCK GROUNDWATER ELEVATION CONTOUR (IN FEET)
- (271.87) BEDROCK GROUNDWATER ELEVATION (IN FEET)
- 190 J TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATION $\mu g/L$
- J = ESTIMATED VALUE
- BDL = BELOW DETECTION LIMITS

TOTAL VOLATILE ORGANIC COMPOUND (VOC) CONCENTRATIONS

- $10\mu g/L - 100\mu g/L$
- $100\mu g/L - 1000\mu g/L$
- $>1000\mu g/L$

NOTE:

1997 DATA PRESENTED ONLY FOR WELLS ALSO SAMPLED IN 2008.

400' 0 400'

MAP REFERENCE:

1. GEI CONSULTANTS, INC. DRAWING ENTITLED, "2002 ANNUAL MONITORING REPORT TINKHAM GARAGE SITE LONDONDERRY, NEW HAMPSHIRE MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATIONS". FIGURE 3, FEBRUARY 2003.

Title:

MAY 1997 BEDROCK GROUNDWATER ELEVATIONS AND TOTAL VOC CONCENCTRATIONS

CANNONS ENGINEERING – SITE TECHNICAL COMMITTEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared For: CANNONS ENGINEERING

ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: KS	Date: 2/27/09	FIGURE
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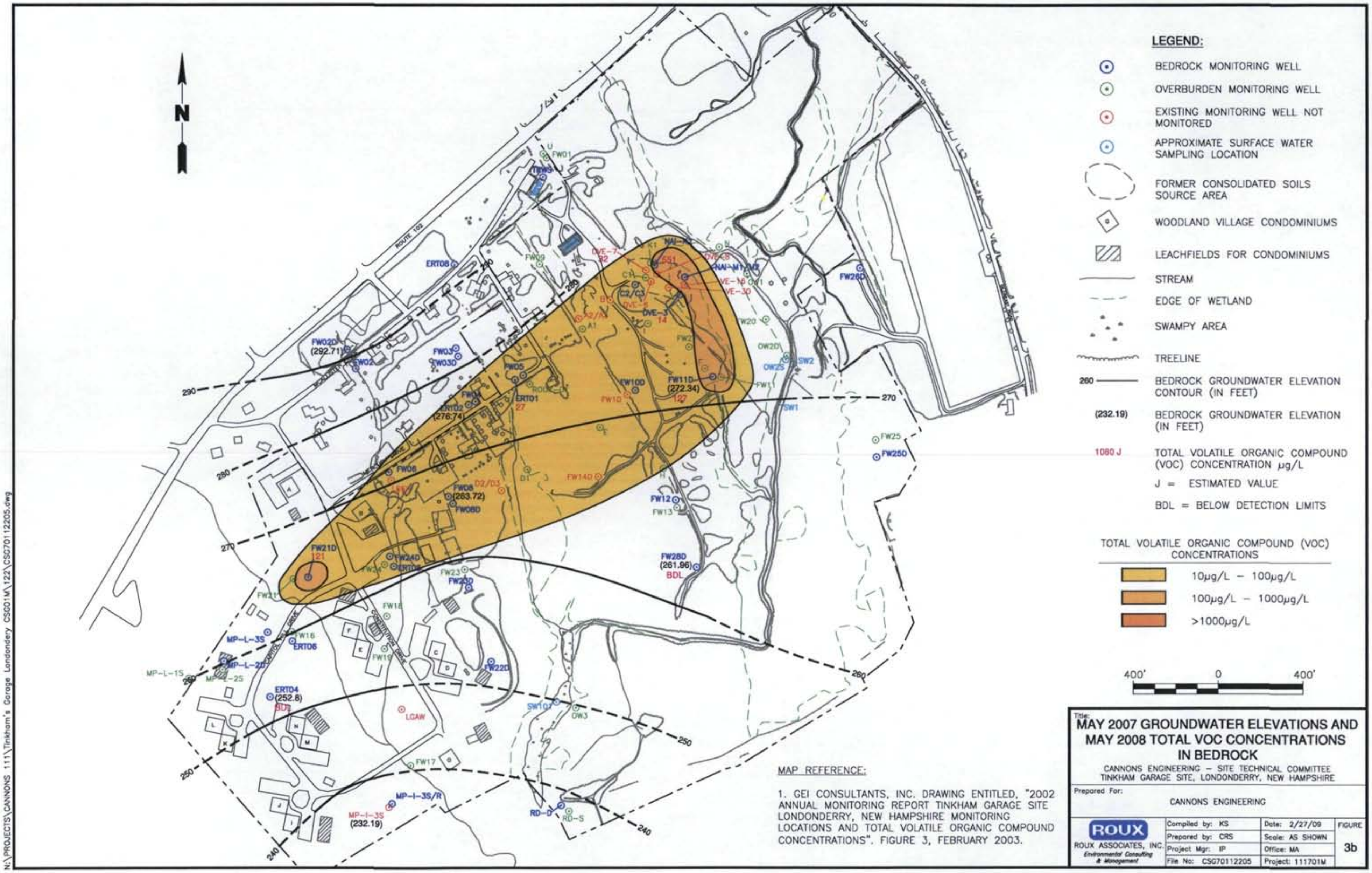

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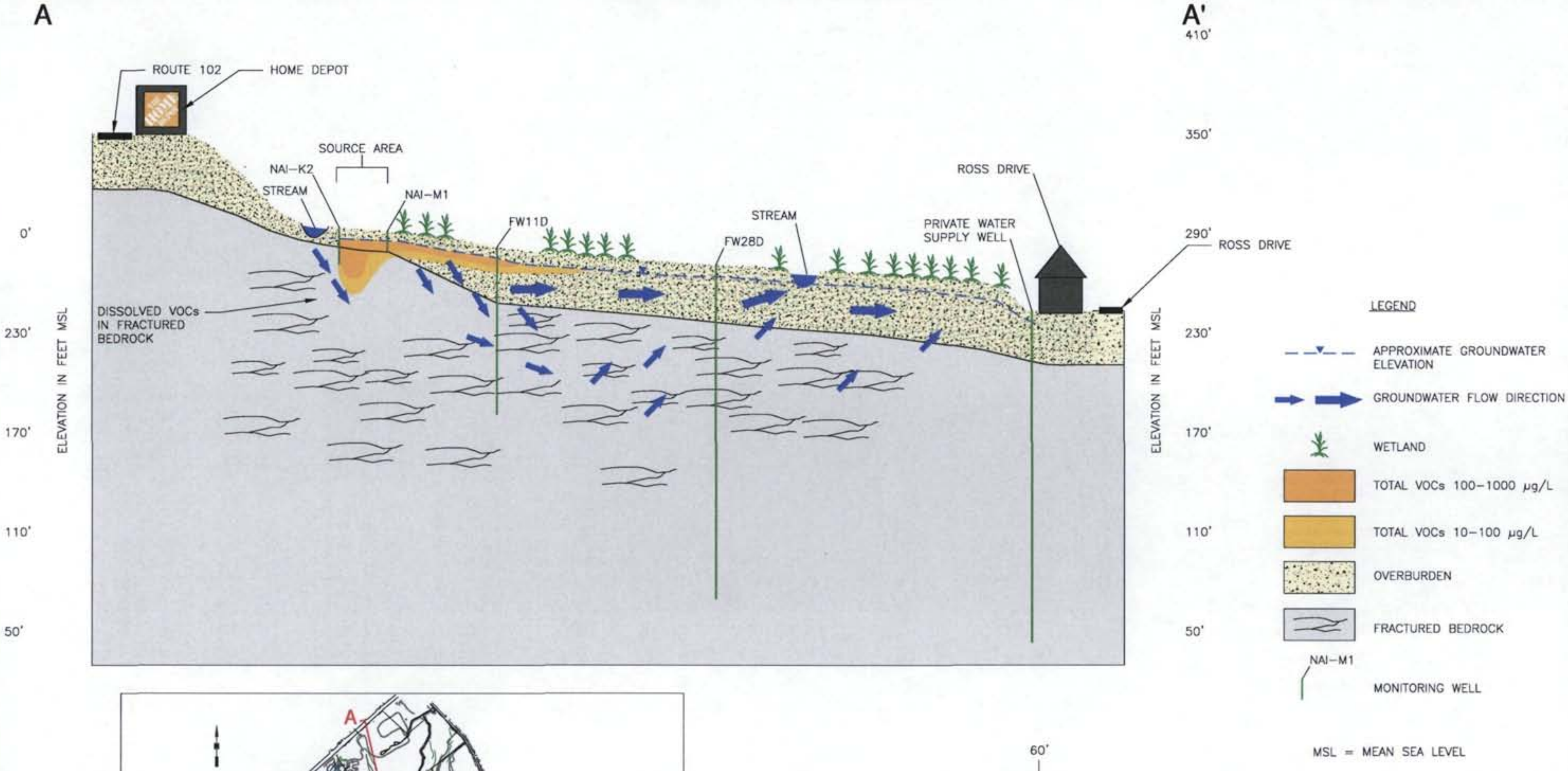

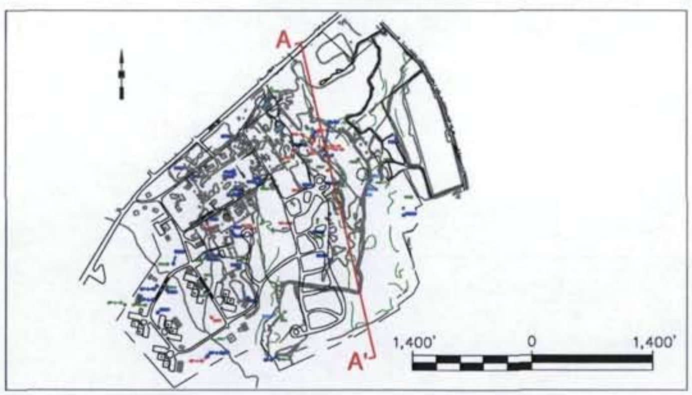

60'

0'

400'

SCALE

NOTE:
FEATURES NOT TO SCALE

Title:

CROSS SECTION A-A'

CANNONS ENGINEERING – SITE TECHNICAL COMMITTEE
TINKHAM GARAGE SITE, LONDONDERRY, NEW HAMPSHIRE

Prepared For:
CANNONS ENGINEERING

ROUX ASSOCIATES, INC. Environmental Consulting & Management	Compiled by: KS	Date: 2/17/09	FIGURE
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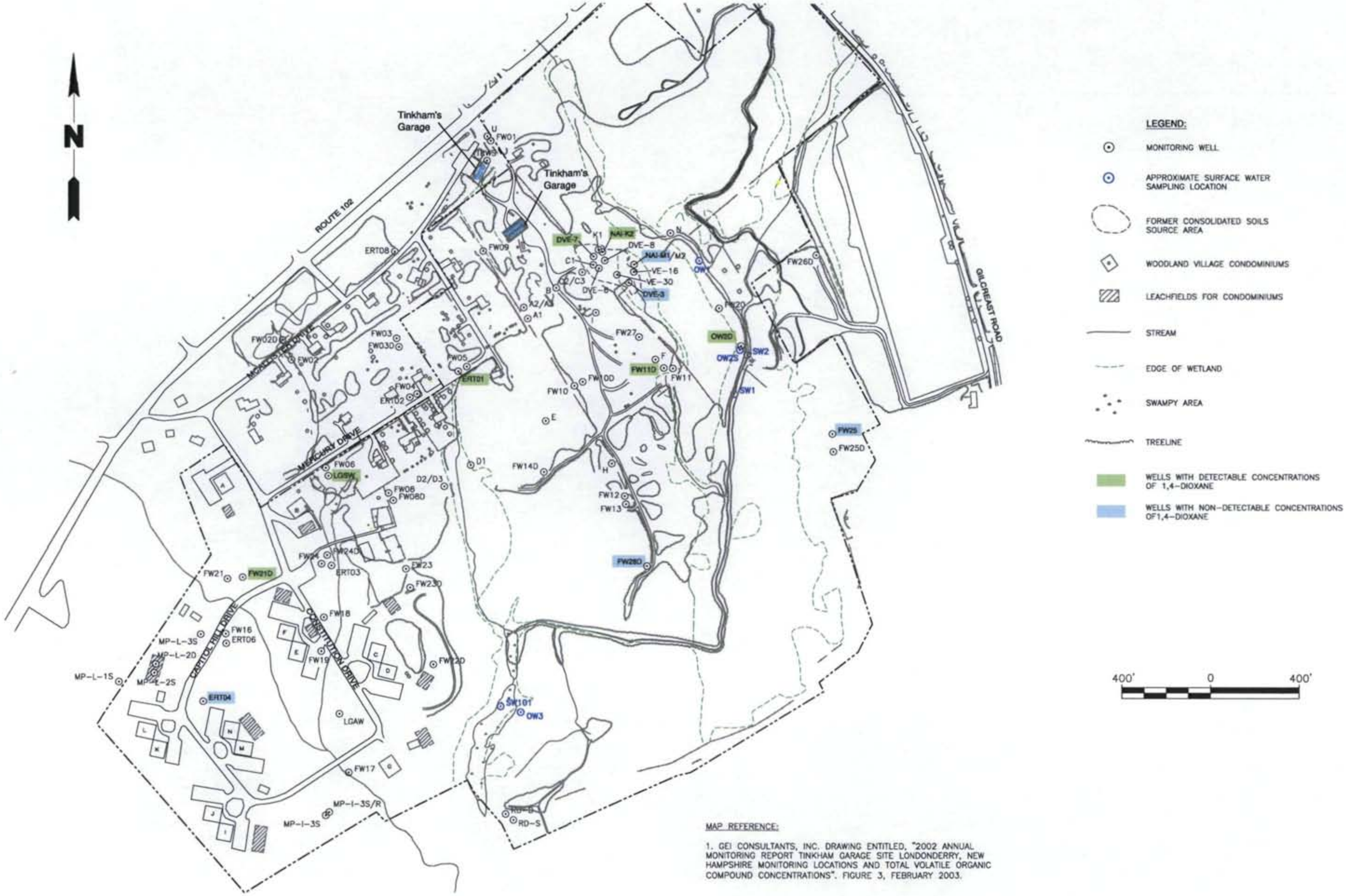
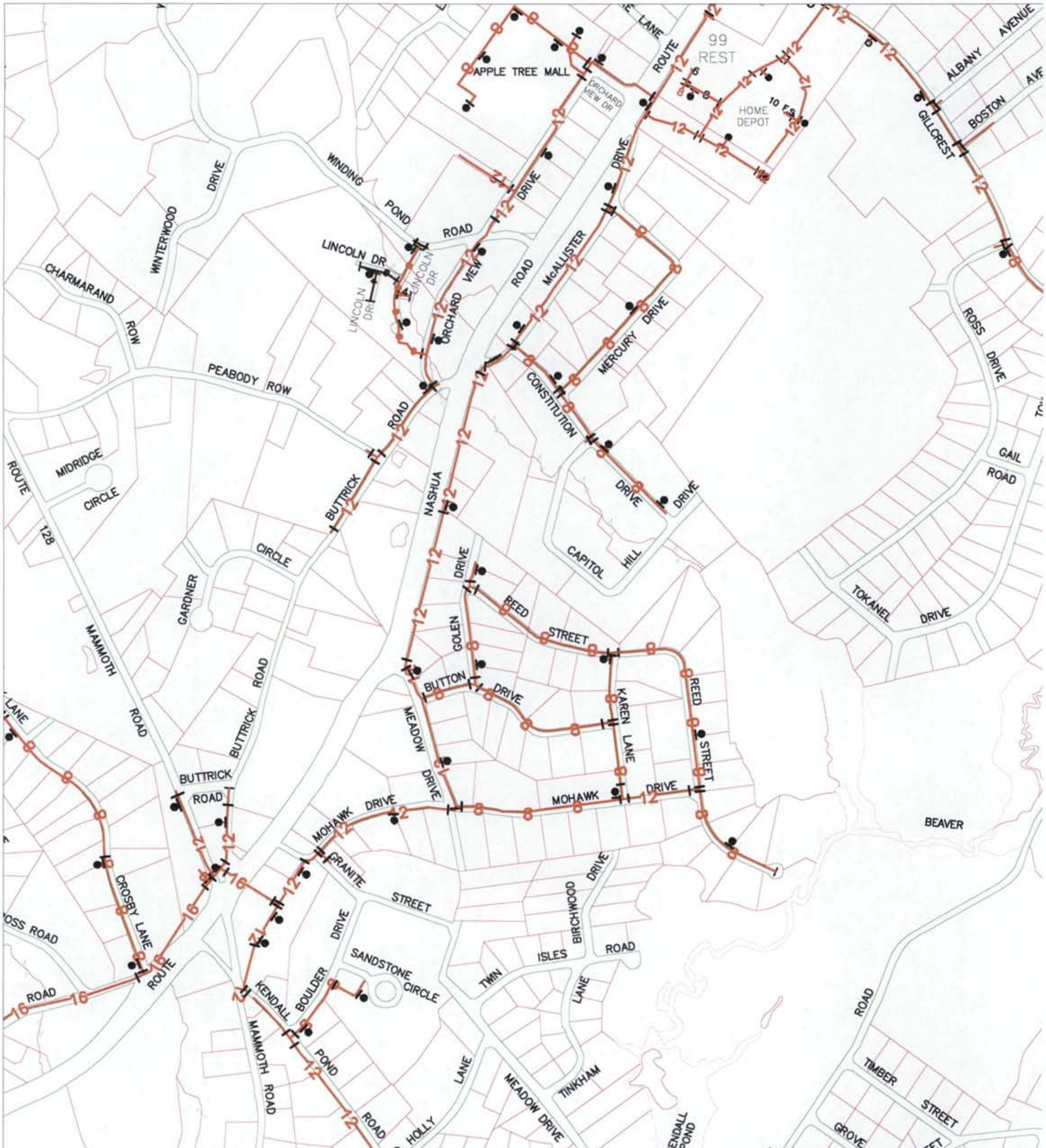


MAP REFERENCE:

1. GEI CONSULTANTS, INC. DRAWING ENTITLED, "2002 ANNUAL MONITORING REPORT TINKHAM GARAGE SITE LONDONDERRY, NEW HAMPSHIRE MONITORING LOCATIONS AND TOTAL VOLATILE ORGANIC COMPOUND CONCENTRATIONS". FIGURE 3, FEBRUARY 2003.



APPLE TREE MALL
ORCHARD VIEW DR
99 REST
HOME DEPOT
10 FS
ROUTE
LANE
ALBANY AVENUE
BOSTON AVE
GILLCREST
WINDING POND ROAD
WINTERWOOD DRIVE
LINCOLN DR
ORCHARD VIEW DRIVE
McALLISTER DRIVE
MERCURY DRIVE
CHARMARAND ROW
PEABODY ROW
ROSS DRIVE
CONSTITUTION DRIVE
NASHUA ROAD
BUTTRICK ROAD
ROUTE 128
MIDRIDGE CIRCLE
GAIL ROAD
CAPITOL HILL DRIVE
GARDNER CIRCLE
MAMMOTH ROAD
TOKANEL DRIVE
REED STREET
GOLEN DRIVE
BUTTON DRIVE
KAREN LANE
MEADOW DRIVE
BUTTRICK ROAD
MOHAWK DRIVE
BEAVER
CROSBY LANE
GRANITE STREET
BIRCHWOOD DRIVE
SANDSTONE CIRCLE
BOULDER DRIVE
TWIN ISLES ROAD
KENDALL POND ROAD
TINKHAM LANE
MEADOW DRIVE
HOLLY LANE
KENDALL POND
SOUTH ROAD
TIMBER STREET
GROVE STREET
EVERGREEN
FOREST

TABLES

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Table 3
Detected Volatile Organic Compounds in Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)																				
		Bedrock Groundwater																				
		ERT01							LGSW							FW21D						
		5/17/2002	5/30/2003	5/19/2004	5/3/2005	5/18/2006	5/14/2007	5/15/2008	5/20/2002	5/30/2003	8/2/2004	5/3/2005	5/18/2006	5/14/2007	5/15/2008	5/16/2002	5/30/2003	5/18/2004	5/3/2005	5/18/2006	5/15/2007	5/15/2008
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	9	11	9	8	9	8	8	5	5	4	4	4	4	3
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	28	21	21	20	20	19	19
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	5	2	< 2	2	< 2	2	2	5	5	4	4	4	4	3	34	26	21	22	21	20	19
1,2-Dichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	22	12	11	13	12	15	15	2	2	2	< 2	< 2	< 2	< 2	20	21	18	19	18	17	14
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	6	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	99	69	60	52	47	40	35
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	40	30	30	30	30	30	30
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	2	2	1	1	1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	29	18	2	15	10	9	10	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	6	5	6	5	5	4	< 2	15	6	6	6	5	4	< 2
Isopropyl ether	NE	NT	< 5	< 5	< 5	< 5	< 5	< 5	NT	< 5	< 5	< 5	< 5	< 5	< 5	NT	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	3	3	2	2	2	1
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		58	32	13	30	22	26	27	27	25	21	17	18	16	11	249	183	164	156	148	136	121
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	31 J	NT	NT	NT	NT	NT	NT	57 J	NT	NT	NT	NT	NT	NT	16 J

Notes:

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2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
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4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3
Detected Volatile Organic Compounds in Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)													
		Bedrock Groundwater													
		FW28D													
		5/21/2002	11/11/2002	5/30/2003	11/6/2003	5/19/2004	11/3/2004	5/3/2005	11/18/2005	5/18/2006	11/8/2006	5/14/2007	5/15/2008	11/6/2008	11/6/2008-Dup
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Isopropyl ether	NE	NT	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	< 1 R	< 2	NT

Notes:

1. All results are in micrograms per liter (µg/L).
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3
Detected Volatile Organic Compounds in Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)								
		Bedrock Groundwater								
		FW11D								
		5/20/2002	5/30/2003	5/19/2004	5/3/2005	5/17/2006	1/15/2007	8/13/2007	11/14/2007	5/15/2008
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	2	3	2
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	1	< 1	< 1	< 1	< 1	< 1	5	8	6
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	7	2	3	< 2	3	< 2	12	19	15
1,2-Dichloroethane	5	4	< 2	< 2	< 2	< 2	< 2	7	10	8
1,1-Dichloroethene	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	1	1
cis-1,2-Dichloroethene	70	16	6	9	3	9	< 2	24	31	28
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	10	< 10	< 10	< 10	< 10	< 10	10	20	20
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	16	7	9	5	7	3	6	8	10
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	8	< 2	< 2	< 2	3	< 2	28	27	37
Isopropyl ether	NE	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2
Total VOCs		54	15	21	8	22	3	84	129	127
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	NT	450 J

Notes:

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3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater F
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected abo
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3
Detected Volatile Organic Compounds in Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)													
		Bedrock Groundwater													
		ERT04													
		5/17/2002	11/11/2002	5/30/2003	11/6/2003	5/18/2004	11/3/2004	5/3/2005	11/18/2005	5/18/2006	11/8/2006	5/15/2007	11/14/2007	5/15/2008	11/5/2008
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Isopropyl ether	NE	NT	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		BDL	BDL	BDL	BDL	BDL	BDL	1	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	< 1 R	< 2

Notes:

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2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3
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2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)							
		Overburden Groundwater							
		FW25							
		5/16/2002	5/30/2003	5/20/2004	5/3/2005	5/18/2006	5/15/2007	6/13/2007	5/15/2008
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Isopropyl ether	NE	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	< 1 R

Notes:

1. All results are in micrograms per liter (µg/L).
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limi
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire G
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the S
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3
Detected Volatile Organic Compounds in Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)																		
		Source Area Groundwater																		
		OW2D																		
		5/20/2002	11/1/2002	5/30/2003	11/6/2003	11/6/2003-Dup	5/19/2004	11/3/2004	11/3/2004-Dup	5/3/2005	11/18/2005	11/18/2005-Dup	5/17/2006	11/8/2006	5/14/2007	11/14/2007	11/14/2007-Dup	5/14/2008	5/14/2008-Dup	11/6/2008
Benzene	5	4	5	4	4	4	3	4	4	< 1	3	3	2	2	1	2	2	1	1	< 1
Acetone	700	< 10	20	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	40	< 10	30	< 10	< 10	30	30	< 10
Chlorobenzene	NE	5	< 2	4	4	4	5	3	3	< 2	4	4	3	3	3	3	3	3	3	2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	40	37	36	42	42	39	32	32	< 1	38	36	36	40	35	28	29	31	30	27
1,4-Dichlorobenzene	75	4	3	3	3	4	4	3	3	< 1	4	3	3	4	3	3	3	3	3	3
1,1-Dichloroethane	81	49	52	55	54	55	47	43	42	< 2	38	37	34	31	31	29	29	24	24	21
1,2-Dichloroethane	5	51	48	48	52	54	43	38	35	< 2	33	32	28	29	26	24	25	20	20	18
1,1-Dichloroethene	7	3	3	4	3	3	3	2	2	< 1	3	3	1	2	2	2	2	1	1	1
cis-1,2-Dichloroethene	70	450	300	480	310	320	350	290	280	8	260	250	210	210	220	180	160	150	150	160
Diethyl ether	NE	< 5	9	8	9	9	7	7	6	< 5	6	6	6	6	5	6	6	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	3	3	2	2	2	3	2	2	< 1	2	2	1	2	1	1	1	< 1	< 1	< 1
n-Propylbenzene	NE	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	6	5	6	5	5	7	5	5	< 2	7	6	7	7	7	4	4	5	5	4
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	<2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	33	19	25	22	23	29	19	19	< 2	23	21	21	20	19	11	12	14	14	13
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	32	26	23	20	20	23	15	15	< 2	13	12	10	12	9	11	11	6	6	7
Isopropyl ether	NE	NT	NT	6	7	7	7	6	6	< 5	5	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	2	< 2	2	3	< 2	< 2	< 2	< 2	< 2	< 2	18	< 2	4	< 2	< 2	5	3	< 2
Total VOCs		680	532	704	539	555	570	467	454	8	439	420	420	388	396	284	287	293	289	256
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	200 J	220 J	350

Notes:

1. All results are in micrograms per liter (µg/L)
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3

Detected Volatile Organic Compounds in Groundwater (2002-2008)
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Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)															
		Source Area Groundwater															
		FW20								DYE-3							
		5/20/2002	5/30/2003	5/19/2004	5/3/2005	5/17/2006	5/15/2007	6/13/2007	5/14/2008	5/21/2002	6/25/2003	5/20/2004	5/3/2005	5/17/2006	5/14/2007	6/13/2007	5/14/2008
Benzene	5	3	4	1	2	5	2	< 1	3	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	6	5	4
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichlorobenzene	600	10	9	4	8	15	7	3	9	< 1	2	1	< 1	< 1	8	6	5
1,4-Dichlorobenzene	75	2	2	< 1	< 1	2	2	1	2	< 1	5	2	< 1	< 1	6	5	3
1,1-Dichloroethane	81	27	29	9	18	39	13	8	18	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2-Dichloroethane	5	21	28	7	16	33	9	6	14	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	1	1	< 1	< 1	2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	94	92	27	57	140	34	20	49	5	3	11	6	< 2	4	3	2
Diethyl ether	NE	7	6	< 5	5	11	< 5	< 5	5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	2	< 2	< 2	< 2	< 2	< 2
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	180	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethane	5	8	6	2	8	12	3	< 2	4	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	3	< 1	< 1	< 1	2	1	< 1
Vinyl chloride	2	48	35	13	33	81	17	11	35	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Isopropyl ether	NE	NT	< 5	< 5	< 5	7	< 5	< 5	< 5	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		221	204	63	145	349	87	49	139	5	193	16	8	BDL	26	20	14
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	NT	140 J	NT	NT	NT	NT	NT	NT	NT	< 1 R

Notes:

1. All results are in micrograms per liter (µg/L)
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3

Detected Volatile Organic Compounds in Groundwater (2002-2008)

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Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)														
		Source Area Groundwater														
		DVE-7							NAI-M1							
		6/25/2003	5/20/2004	5/3/2005	6/3/2006	5/14/2007	6/13/2007	5/14/2008	5/21/2002	6/25/2003	5/20/2004	5/3/2005	5/17/2006	5/14/2007	6/13/2007	5/14/2008
Benzene	5	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	**15**	< 2	< 2	< 2	< 2	< 2	**2**
1,2-Dichlorobenzene	600	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**2**	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	< 2	**2**	< 2	< 2	< 2	< 2	< 2	**2**	**9**	**3**	< 2	< 2	< 2	**7**	**6**
1,2-Dichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	**3**	< 2	< 2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	**1**	< 1	< 1	< 1	< 1	< 1	< 1
cis-1,2-Dichloroethene	70	**22**	**19**	**3**	< 2	**2**	< 2	**4**	**20**	**62**	**10**	**5**	**6**	**4**	**29**	**31**
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	**21**	**9**	**5**	**17**	**13**	**9**	**2**	**75**	**9**	**3**	**3**	**2**	**5**	**3**
Tetrahydrofuran (THF)	154	**15**	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	**20**	**30**	**8**	**4**	**6**	**4**	**6**	< 2	**140**	**6**	< 2	< 2	< 2	**16**	**24**
1,1,2-Trichloroethane	5	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	**5**	< 2	< 2	< 2	< 2	< 2	< 2
Trichloroethene	5	**35**	**57**	**9**	**5**	**9**	**7**	**13**	**7**	**270**	**24**	**5**	**11**	**7**	**39**	**48**
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Vinyl chloride	2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	**4**	< 2	**6**	**4**	< 2	< 2	< 2	< 2
Isopropyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5	NT	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 1	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Total VOCs		92	129	29	14	34	24	32	37	580	58	17	20	13	96	114
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	2 J	NT	NT	NT	NT	NT	NT	NT	< 1 R

Notes:

1. All results are in micrograms per liter (µg/L).
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402)
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound.
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 3

Detected Volatile Organic Compounds In Groundwater (2002-2008)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/ NHDES AGQS	Volatile Organic Compound Results (µg/L)						
		Source Area Groundwater						
		NAI-K2						
		6/25/2003	5/20/2004	5/3/2005	5/17/2006	5/14/2007	6/13/2007	5/14/2008
Benzene	5	9	4	3	1	< 1	< 1	2
Acetone	700	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Chlorobenzene	NE	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Chloroform	NE	12	7	5	3	3	2	5
1,2-Dichlorobenzene	600	20	12	9	4	3	3	6
1,4-Dichlorobenzene	75	< 1	< 1	< 1	< 1	< 1	< 1	< 1
1,1-Dichloroethane	81	56	29	26	12	10	8	16
1,2-Dichloroethane	5	6	3	2	< 2	< 2	< 2	< 2
1,1-Dichloroethene	7	17	8	8	4	3	2	4
cis-1,2-Dichloroethene	70	920	390	290	130	83	65	190
Diethyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	< 1	< 1	< 1	< 1	< 1	< 1
iso-Propylbenzene	280	< 1	< 1	< 1	< 1	< 1	< 1	< 1
n-Propylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	< 1
Tetrachloroethene	5	< 2	61	58	29	27	23	40
Tetrahydrofuran (THF)	154	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	1000	< 1	< 1	1	< 1	< 1	< 1	< 1
1,1,1-Trichloroethane	200	310	150	120	45	47	42	98
1,1,2-Trichloroethane	5	14	7	5	< 2	< 2	< 2	3
Trichloroethene	5	87	300	250	140	110	110	180
1,2,4-Trimethylbenzene	NE	< 1	< 1	< 1	< 1	< 1	< 1	1
Vinyl chloride	2	18	9	13	9	7	8	6
Isopropyl ether	NE	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Xylenes (Total)	10000	< 2	< 2	< 2	< 2	< 2	< 2	< 2
trans-1,2-Dichloroethene	100	11	5	4	< 2	< 2	< 2	< 2
Total VOCs		1480	986	794	377	293	263	551
1,4-Dioxane	3	NT	NT	NT	NT	NT	NT	1 J

Notes:

1. All results are in micrograms per liter (µg/L).
2. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
3. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
4. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
5. NE indicates that no MCL/AGQS Standard exists for that compound
6. Bold values indicate compounds that were detected above laboratory minimum detection limits.
7. Shaded values indicate compounds that were detected at concentrations greater that the MCL/AGQS.
8. Total VOCs include all detected VOCs except 1,4-Dioxane. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. R indicates that the result is rejected based on data validation criteria.
10. J indicates that the result is estimated based on data validation criteria.
11. NT indicates not tested for this parameter.

Table 4
Detected Volatile Organic Compounds in Groundwater (1997)
2009 Five-Year Review Report
Tinkham Garage Site, Londonderry, New Hampshire

Detected Volatile Organic Compounds	MCL/NHDES AGQS	Volatile Organic Compound Results (µg/L)												
		Bedrock Groundwater						Overburden Groundwater	Source Area Groundwater					
		ERT01	LGSW	FW21D	FW28D	FW11D	ERT04	FW25	OW2D	FW20	DVE-3	DVE-7	NAI-M1	NAI-K2
		5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997	5/15/1997
1,1,1-Trichloroethane	200	< 1	<1	< 5	< 1	< 5	< 5	< 1	< 50	< 5	< 5	**10**	< 5	**42**
1,1-Dichloroethane	81	**2.8**	**3.2**	**22**	< 1	**22**	< 5	< 1	**98**	**19**	< 5	< 5	**11**	**8.4**
1,1-Dichloroethene	7	< 1	< 1	< 5	< 1	< 5	< 5	< 1	**10J**	< 5	< 5	< 5	< 5	< 5
1,2-Dichlorobenzene	600	< 1	< 1	**28**	< 1	< 5	< 5	< 1	**50J**	**6.9**	< 5	< 5	**11**	**6.2**
1,2-Dichloroethane	5	**2**	**2.1**	< 5	< 1	**18**	< 5	< 1	**120**	**19**	< 5	< 5	**5.5**	< 5
1,2-Dichloroethene (total)	70	**7J**	**2.8**	**9.9**	< 1	**45**	< 5	< 1	**760**	**68**	< 5	**11**	**64J**	**120J**
Benzene	5	< 1	**6.3**	< 5	< 1	< 5	< 5	< 1	< 50	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	700	< 1	**2.3**	**100**	< 1	< 5	< 5	< 1	< 50	< 5	< 5	< 5	< 5	< 5
m&p-Xylene	10000	< 1	< 2	**11**	< 1	< 5	< 5	< 1	< 50	< 5	< 5	< 5	< 5	< 5
Tetrachloroethene	5	< 1	< 1	< 5	< 1	**13**	< 5	< 1	< 50	< 5	< 5	**10**	**8.6**	< 5
Trichloroethene	5	**16**	**1.4**	< 5	< 1	**88**	< 5	< 1	**40J**	**6**	< 5	**10**	**25**	**39**
Vinyl chloride	2	< 1	**2.3**	**3J**	< 1	**4J**	< 5	< 1	< 50	**20**	< 5	< 5	**24**	**9.3**
Total VOCs		28	20	174	BDL	190	BDL	BDL	1078	139	BDL	41	149	225

General Notes:
1. All units are µg/L.
2. Data originally presented in GEI Consultants Inc., 1997, *Management of Migration, Water Quality Monitoring Program, Quarter 13 Report, July 31.* Only analytes detected in at least one sample are reported here.
3. < indicates analyte not detected at a concentration above the specified laboratory reporting limit.
4. Laboratory analyses were performed by Eastern Analytical Inc., Concord, New Hampshire, using Environmental Protection Agency (EPA) Method 8260B.
5. AGQS indicates Ambient Groundwater Quality Standards established by the New Hampshire Groundwater Protection Rules (Env-Wq 402).
6. MCL indicates Maximum Contaminant Concentration as established by the USEPA under the Safe Drinking Water Act.
7. The MCL for cis-1,2-Dichloroethylene is presented as a surrogate MCL for 1,2-Dichloroethylene (total).
8. BDL indicates that no VOCs were detected above the laboratory detection limit.
9. J indicates the result was an estimated value.

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APPENDICIES

Appendix A- Vapor Intrusion Assessment Letters

Appendix B- Public Notice to Start Five-Year Review

Appendix C- Site Inspection Checklist

Appendix D- Not Used

Appendix E- Technical Assessment of Groundwater Contamination

Appendix F - Updated Conceptual Site Model

Appendix A- Vapor Intrusion Assessment Letters

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES INC
ROUX
25 CORPORATE DRIVE
SUITE 230
BURLINGTON, MASSACHUSETTS 01803 TEL: 781-270-6600 FAX: 781-270-9066

FILE COPY

May 20, 2004

Byron Mah
U.S. Environmental Protection Agency
One Congress Street
Suite 1100
HBO
Boston, Massachusetts 02114-2023

Re: Potential Vapor Intrusion
Tinkham Garage Superfund Site
Londonderry, New Hampshire

Dear Mr. Mah:

Roux Associates, Inc. (Roux Associates) has prepared this letter at the request of the Cannons Sites Group PRP Committee. This letter documents the basis for no further investigations for potential vapor intrusion into indoor air from shallow groundwater in the condominium area in the western-most portion of the Tinkham Garage Superfund Site (the Site). The basis for no further investigations include:

- The results of groundwater monitoring for ten years;
- A comparison of the groundwater monitoring results to U.S. Environmental Protection Agency <u>Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils</u> (November 2002).

Background

As part of it's second Five-Year Review Report (March 2004), the U.S. Environmental Protection Agency (EPA) recommended a monitoring program to assess the impact of contaminant vapors emanating from shallow groundwater on the health of existing residents. Since the issuance of the March 2004 Five-Year Review Report, Roux Associates has had numerous discussions with the EPA. Based on these discussions, we understand that EPA is concerned about two general areas of the Site:

1. The condominium area approximately 1,900 feet west of the former source area; and
2. The Mercury Drive area approximately 600 feet west of the former source area.

This letter addresses the condominium area. The Mercury Drive area will be addressed under separate cover. A third area, The Nevins Elderly Retirement Community development, is not a concern to EPA because EPA has an agreement with the developer to install passive vapor ventilation systems in each of the homes.

The condominium area is located in the western-most portion of the Site. It includes condominium units on the east and west sides of Constitution Drive. The condominium buildings are each 2.5 stories with concrete slab foundations. The bottom floor is approximately half underground. All of the condominium buildings currently have leachfields.

The condominium area has been a part of the investigations, remediation, and long term monitoring efforts at the Site since the Site was identified in 1978. There are 17 monitoring wells in the condominium area vicinity (ERT03, ERT04, ERT06, FW16, FW-17, FW18, FW19, FW21, FW21D, FW24, FW24D, MP-L-1S, MP-L-2S, MP-L-2D, MP-L-3S, MP-I-3S/R, LGAW). Under the requirements of the Groundwater Management Permit issued in October 2002, monitoring wells FW21D and ERT04 are sampled on an annual and semi-annual basis, respectively. EPA removed the other monitoring wells from the groundwater monitoring program due to the absence/low concentrations of contaminants in the groundwater in the condominium area.

Historic Groundwater Monitoring Data

Shallow groundwater conditions throughout the condominium area have been monitored by overburden monitoring wells FW16, FW17, FW18, FW19, and FW21. A summary of the results of groundwater sampling of these wells has been provided to EPA in Appendix C of the Groundwater Management Permit Application, a portion of which has been copied and attached hereto (Attachment 1).

In summary, the contaminant concentrations in shallow groundwater from each of these monitoring wells have consistently been below laboratory reporting limits and/or the limits specified in the EPA's Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Vapor Intrusion Guidance). The monitoring results from each monitoring well are discussed below:

FW16 – FW16 was sampled ten times between the spring of 1994 and the spring of 1997. Benzene was detected in excess of its Vapor Intrusion Guidance limit of 5 µg/l (ppb) in 1994. Benzene was not detected in the six subsequent monitoring rounds. 1,2-Dichloroethane was detected at 6 ppb in the spring of 1994 in excess of its Vapor Intrusion Guidance limit of 5 ppb. 1,2-Dichloroethane was not detected above 5 ppb since that time.

Based upon EPA's Vapor Intrusion Guidance, no further investigations are warranted in this area.

FW17 – FW17 was sampled five times between the spring of 1994 and the spring of 1997. No contaminants were detected in any of the samples tested. However, the laboratory reporting limit (5 ppb) for one compound of concern, vinyl chloride, was above the Vapor Intrusion Guidance limit of 2 ppb.

It is our opinion that no further investigations are warranted in this area because:

a. No estimated values below the laboratory limit were reported for vinyl chloride. It is routine practice for estimated values below the reporting limit to be reported for this project. The absence of any such results is a strong indication that vinyl chloride was absent.

b. No precursor compounds (trichloroethene, (TCE), tetrachloroethene (PCE), dichloroethenes (DCEs) were detected in any of the groundwater samples tested.

c. No vinyl chloride was detected at laboratory reporting limits down to 1 ppb in the monitoring well further downgradient from FW17 (MP-I-3S/R) in 16 rounds of groundwater sampling between the spring of 1994 and May 2000.

FW18 – FW18 was sampled four times between the spring of 1994 and the spring of 1997. No contaminants were detected in any of the samples tested. However, the laboratory reporting limit (5 ppb) for one compound of concern, vinyl chloride, was above the Vapor Intrusion Guidance limit of 2 ppb.

It is our opinion that no further investigations are warranted in this area because:

a. No estimated values below the laboratory limit were reported for vinyl chloride. It is routine practice for estimated values below the reporting limit to be reported for this project. The absence of any such results is a strong indication that vinyl chloride was absent.

b. No precursor compounds (TCE, PCE, DCEs) were detected in any of the groundwater samples tested.

FW19 – FW19 was sampled seven times between the spring of 1994 and the spring of 1997. No contaminants were detected in any of the samples tested. However, the laboratory reporting limit (5 ppb) for one compound of concern, vinyl chloride, was above the Vapor Intrusion Guidance limit of 2 ppb.

It is our opinion that no further investigations are warranted in this area because:

a. No estimated values below the laboratory limit were reported for vinyl chloride. It is routine practice for estimated values below the reporting limit to be reported for this project. The absence of any such results is a strong indication that vinyl chloride was absent.

b. No precursor compounds (TCE, PCE, DCEs) were detected in any of the groundwater samples tested.

FW21 – FW21 was sampled nine times between the spring of 1994 and the spring of 1997. No contaminants above the Vapor Intrusion Guidance limits were detected in any of the samples tested. However, the laboratory reporting limit (5 ppb) for one compound of concern, vinyl chloride, was above the Vapor Intrusion Guidance limit of 2 ppb.

It is our opinion that no further investigations are warranted in this area because:

a. No estimated values below the laboratory limit were reported for vinyl chloride. It is routine practice for estimated values below the reporting limit to be reported for this project. The absence of any such results is a strong indication that vinyl chloride was absent.

b. No precursor compounds (TCE, PCE, DCEs) were detected in any of the groundwater samples tested since 1995.

c. No vinyl chloride was detected at laboratory reporting limits down to 1 ppb in the monitoring wells downgradient from FW21 (MP-L-3S/R (12 rounds) and FW16 (10 rounds)).

Conclusion

No further investigations for potential vapor intrusion into indoor air from shallow groundwater in the condominium area are warranted. Concentrations of contaminants in shallow groundwater from each of the monitoring wells have consistently been below laboratory reporting limits and/or the limits specified in the EPA's Vapor Intrusion Guidance.

Please contact me if you have any questions about this letter or other conditions at the Site.

Sincerely,

ROUX ASSOCIATES, INC.

Ian M. Phillips, LSP
Principal Scientist

Attachment

ATTACHMENT 1

Historical Data - Select Monitoring Wells

Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WOMP (1994-1997)

Monitoring Program Quarter:	Q1		Q2		Q3		Q4		First Annual- Q5		Q6	
Season and Year:	Late Spring 1994		Summer 1994		Fall 1994		Winter 1994-95		Spring 1995		Summer 1995	
Well Location:	FW-16		FW-16		FW-16		FW-16		FW-16		FW-16	
GEI Sample ID:	92113-FW16-0694		92113-FW16-0894		92113-FW16-1194		92113-FW16-0295		92113-FW16-0595		92113-FW16-0895	
Laboratory Sample Number:	105361		108892		113134		116083		124015		133955	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge	
EPA Method 624 GC/MS VOCs (ug/L)											25 ml purge	
Acetone	25	U	25	U	25	U	25	U	25	U	5.0	U
Benzene	9		7		8		8		5.0	U	1.0	U
Bromodichloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Bromoform	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	1.0	U
Bromomethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
2-Butanone (MEK)	25	U	25	U	25	U	25	U	25	U	5.0	U
Carbon Disulfide	5		5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Carbon Tetrachloride	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	1.0	U
Chlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Chloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Chloroform	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Chloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Dibromochloromethane	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	1.0	U
1,2-Dichlorobenzene	36		27		35		32		5.0	U	2	
1,3-Dichlorobenzene	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U	1.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
1,1-Dichloroethane	41		35		39		32	J	5.0	U	5	
1,2-Dichloroethane	6		5.0	U	5	J	5		5.0	U	1.0	U
1,1-Dichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
1,2-Dichloroethene (total)	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	3	
1,2-Dichloropropane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Ethylbenzene	41		5.0	U	100		28		5.0	U	1.0	U
2-Hexanone	25	U	25	U	25	U	25	U	25	U	5.0	U
4-Methyl-2-pentanone (MIBK)	25	U	25	U	25	U	25	U	25	U	5.0	U
Methylene Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Styrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Tetrachloroethene	5.0	U	5.0	U	5.0	UJ	5.0	UJ	5.0	U	1.0	U
Toluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U	1.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Trichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1	
Trichlorofluoromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Vinyl Acetate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
Vinyl Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
m,p-Xylene	16		10		19		5.0	U	5.0	U	1.0	U
o-Xylene	5		5.0	U	5.0	U	5.0	U	5.0	U	1.0	U
TOTAL VOC CONCENTRATION (ug/L):	159		79		206	J	105	J	0		11	
Dilution Factor:	1		1		1		1		1		1	
Date Sampled:	06/13/94		08/24/94		11/15/94		02/13/95		05/23/95		08/17/95	
Date Analyzed:	06/15/94		08/29/94		11/22/94		02/20/95		06/03/95		08/27/95	

Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Q7		Q8		Second Annual- Q9		Third Annual- Q13	
Season and Year:	Fall 1995		Winter 1995-96		Spring 1996		Spring 1997	
Well Location:	FW-16		FW-16		FW-16		FW-16	
GEI Sample ID:	92113-FW16-1195		92113-FW16-0296		92113-FW16-0596		92113-FW16-0597	
Laboratory Sample Number:	138678		142742		148301		8736.22	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge	
EPA Method 624 GC/MS VOCs (ug/L)	25 ml purge		25 ml purge		25 ml purge			
Acetone	5.0	U	5.0	U	5.0	UJ	20	UJ
Benzene	1.0	U	1.0	U	1.0	U	5.0	U
Bromodichloromethane	1.0	U	1.0	U	1.0	U	5.0	U
Bromoform	1.0	U	1.0	U	1.0	U	5.0	U
Bromomethane	1.0	U	1.0	U	1.0	U	5.0	U
2-Butanone (MEK)	5.0	U	5.0	U	5.0	U	20	U
Carbon Disulfide	1.0	U	1.0	U	1.0	U	5.0	U
Carbon Tetrachloride	1.0	U	1.0	U	1.0	U	5.0	U
Chlorobenzene	1.0	U	1.0	U	1.0	U	5.0	U
Chloroethane	1.0	U	1.0	U	1.0	U	5.0	U
2-Chloroethylvinyl ether	1.0	U	1.0	U	1.0	U	5.0	U
Chloroform	1.0	U	1.0	U	1.0	U	5.0	U
Chloromethane	1.0	U	1.0	U	1.0	U	5.0	U
Dibromochloromethane	1.0	U	1.0	U	1.0	U	5.0	U
1,2-Dichlorobenzene	1.0	U	1.0	U	1.0	U	6.0	
1,3-Dichlorobenzene	1.0	U	1.0	U	1.0	U	5.0	U
1,4-Dichlorobenzene	1.0	U	1.0	U	1.0	U	5.0	U
1,1-Dichloroethane	1.0	U	1.0	U	1.0	U	6.3	
1,2-Dichloroethane	1.0	U	1.0	U	1.0	U	5.0	U
1,1-Dichloroethene	1.0	U	1.0	U	1.0	U	5.0	U
1,2-Dichloroethene (total)	1.0	U	1.0	U	1.0	U	5.0	U
1,2-Dichloropropane	1.0	U	1.0	U	1.0	U	5.0	U
cis-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	5.0	U
trans-1,3-Dichloropropene	1.0	U	1.0	U	1.0	U	5.0	U
Ethylbenzene	1.0	U	1.0	U	1.0	U	5.0	U
2-Hexanone	5.0	U	5.0	U	5.0	UJ	20	U
4-Methyl-2-pentanone (MIBK)	5.0	U	5.0	U	5.0	UJ	20	U
Methylene Chloride	1	U	1.0	U	1.0	U	5.0	U
Styrene	1.0	U	1.0	U	1.0	U	5.0	U
1,1,2,2-Tetrachloroethane	1.0	U	1.0	U	1.0	U	5.0	U
Tetrachloroethene	1.0	U	1.0	U	1.0	U	5.0	U
Toluene	1.0	U	1.0	U	1.0	U	5.0	U
1,1,1-Trichloroethane	1.0	U	1.0	U	1.0	U	5.0	U
1,1,2-Trichloroethane	1.0	U	1.0	U	1.0	U	5.0	U
Trichloroethene	1.0	U	1.0	U	1.0	U	5.0	U
Trichlorofluoromethane	1.0	U	1.0	U	1.0	U	5.0	U
Vinyl Acetate	1.0	U	1.0	U	1.0	U	5.0	U
Vinyl Chloride	1.0	U	1.0	U	1.0	U	5.0	U
m,p-Xylene	1.0	U	1.0	U	2.0	U	5.0	U
o-Xylene	1.0	U	1.0	U	1.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0		0		12	
Dilution Factor:	1		1		1		1	
Date Sampled:	11/13/95		02/15/96		05/15/96		05/14/97	
Date Analyzed:	11/21/95		02/20/96		05/22/96		05/17/97	

Comparative Volatile Organic Compound Results for the FW Series Wells: Tinkham Garage MOM WOMP (1994-1997)

Monitoring Program Quarter:	Q1		Q2		First Annual: Q5		Second Annual: Q9		Third Annual: Q13	
Season and Year:	Late Spring 1994		Summer 1994		Spring 1995		Spring 1996		Spring 1997	
Well Location:	FW-17		FW-17		FW-17		FW-17		FW-17	
GEI Sample ID:	92113-FW17-0694		92113-FW17-0894		92113-FW17-0595		92113-FW17-0596		92113-FW17-0597	
Laboratory Sample Number:	105360		108885		124026		148355		8726 06	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge		Eastern Analytical, Inc.	
EPA Method 624 GC/MS VOCs (ug/L)										
Acetone	25	U	25	U	25	U	25	U	20	UJ
Benzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromomethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone (MEK)	25	U	25	U	25	U	25	U	20	U
Carbon Disulfide	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethene (total)	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloropropane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Hexanone	25	U	25	U	25	U	25	U	20	U
4-Methyl-2-pentanone (MIBK)	25	U	25	U	25	U	25	U	20	U
Methylene Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U
Tetrachloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	5.0	U	5.0	U	5.0	U	5.0	UJ	5.0	U
Vinyl Acetate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0		0		0		0	
Dilution Factor:	1		1		1		1		1	
Date Sampled:	06/13/94		08/24/94		05/23/95		05/15/96		05/13/97	
Date Analyzed:	06/15/94		08/29/94		06/02/95		05/20/96		05/16/97	

Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Q1		First Annual- Q5		Second Annual- Q9		Third Annual- Q13	
Season and Year:	Late Spring 1994		Spring 1995		Spring 1996		Spring 1997	
Well Location:	FW-18		FW-18		FW-18		FW-18	
GEI Sample ID:	92113-FW18-0694		92113-FW18-0595		92113-FW18-0596		92113-FW18-0597	
Laboratory Sample Number:	105467		123946		148479		8726 01	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		Eastern Analytical, Inc.	
EPA Method 624 GC/MS VOCs (ug/L)								
Acetone	25	U	25	U	25	U	20	UJ
Benzene	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	5.0	U	5.0	U	5.0	U	5.0	U
Bromomethane	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone (MEK)	25	U	25	U	25	U	20	U
Carbon Disulfide	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	5.0	U	5.0	U	5.0	U	5.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethene	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethene (total)	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloropropane	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	5.0	U	5.0	U	5.0	U	5.0	U
2-Hexanone	25	U	25	U	25	U	20	U
4-Methyl-2-pentanone (MIBK)	25	U	25	U	25	U	20	U
Methylene Chloride	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U	5.0	U	5.0	U
Tetrachloroethene	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	5.0	U	5.0	U	5.0	U	5.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	5.0	U	5.0	U	5.0	UJ	5.0	U
Vinyl Acetate	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	5.0	U	5.0	U	5.0	U	5.0	U
m,p-Xylene	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	5.0	U	5.0	U	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0		0		0	
Dilution Factor:	1		1		1		1	
Date Sampled:	06/14/94		05/22/95		05/17/96		05/13/97	
Date Analyzed:	06/16/94		05/28/95		05/24/96		05/15/97	

Comparative Volatile Organic Compound Results for the FW Series Wells: Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Q1		Q2		Q3		Q4		First Annual Q5	
Season and Year:	Late Spring 1994		Summer 1994		Fall 1994		Winter 1994-95		Spring 1995	
Well Location:	FW-19		FW-19		FW-19		FW-19		FW-19	
GEI Sample ID:	92113-FW19-0694		92113-FW19-0894		92113-FW19-1194		92113-FW19-0295		92113-FW19-0595	
Laboratory Sample Number:	105465		108887		113144		116885		123945	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge	
EPA Method 624 GC/MS VOCs (ug/L)										
Acetone	25	U	25	U	25	U	25	U	25	U
Benzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Bromomethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone (MEK)	25	U	25	U	25	U	25	U	25	U
Carbon Disulfide	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Chlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
1,2-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
1,1-Dichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethene (total)	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloropropane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Hexanone	25	U	25	U	25	U	25	U	25	U
4-Methyl-2-pentanone (MIBK)	25	U	25	U	25	U	25	U	25	U
Methylene Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Tetrachloroethene	5.0	U	5.0	U	5.0	UJ	5.0	U	5.0	U
Toluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Acetate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0		0		0		0	
Dilution Factor:	1		1		1		1		1	
Date Sampled:	06/14/94		08/24/94		11/15/94		02/13/95		05/22/95	
Date Analyzed:	06/16/94		08/29/94		11/22/94		02/18/95		05/26/95	

Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Second Annual- Q9		Third Annual- Q13	
Season and Year:	Spring 1996		Spring 1997	
Well Location:	FW-19		FW-19	
GEI Sample ID:	92113-FW19-0596		92113-FW19-0597	
Laboratory Sample Number:	148478		8726.07	
Laboratory:	NET/Cambridge		Eastern Analytical, Inc.	
EPA Method 624 GC/MS VOCs (ug/L)				
Acetone	25	U	20	UJ
Benzene	5.0	U	5.0	U
Bromodichloromethane	5.0	U	5.0	U
Bromoform	5.0	U	5.0	U
Bromomethane	5.0	U	5.0	U
2-Butanone (MEK)	25	U	20	U
Carbon Disulfide	5.0	U	5.0	U
Carbon Tetrachloride	5.0	U	5.0	U
Chlorobenzene	5.0	U	5.0	U
Chloroethane	5.0	U	5.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U
Chloroform	5.0	U	5.0	U
Chloromethane	5.0	U	5.0	U
Dibromochloromethane	5.0	U	5.0	U
1,2-Dichlorobenzene	5.0	U	5.0	U
1,3-Dichlorobenzene	5.0	U	5.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U
1,1-Dichloroethane	5.0	U	5.0	U
1,2-Dichloroethane	5.0	U	5.0	U
1,1-Dichloroethene	5.0	U	5.0	U
1,2-Dichloroethene (total)	5.0	U	5.0	U
1,2-Dichloropropane	5.0	U	5.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U
Ethylbenzene	5.0	U	5.0	U
2-Hexanone	25	U	20	U
4-Methyl-2-pentanone (MIBK)	25	U	20	U
Methylene Chloride	5.0	U	5.0	U
Styrene	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U
Tetrachloroethene	5.0	U	5.0	U
Toluene	5.0	U	5.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U
Trichloroethene	5.0	U	5.0	U
Trichlorofluoromethane	5.0	UJ	5.0	U
Vinyl Acetate	5.0	U	5.0	U
Vinyl Chloride	5.0	U	5.0	U
m,p-Xylene	5.0	U	5.0	U
o-Xylene	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0	
Dilution Factor:	1		1	
Date Sampled:	05/17/96		05/13/97	
Date Analyzed:	05/24/96		05/16/97	

TABLE C.3 Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Q1		Q2		Q3		Q4		First Annual- Q5	
Season and Year:	Late Spring 1994		Summer 1994		Fall 1994		Winter 1994-95		Spring 1995	
Well Location:	FW-21		FW-21		FW-21		FW-21		FW-21	
GEI Sample ID:	92113-FW21-0694		92113-FW21-0894		92113-FW21-1194		92113-FW21-0295		92113-FW21-0595	
Laboratory Sample Number:	105353		108884		113140		116881		124016	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge		NET/Cambridge	
EPA Method 624 GC/MS VOCs (ug/L)										
Acetone	25	U	25	U	25	U	25	U	25	U
Benzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromodichloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Bromoform	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
Bromomethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Butanone (MEK)	25	U	25	U	25	U	25	U	25	U
Carbon Disulfide	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Carbon Tetrachloride	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
Chlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
2-Chloroethylvinyl ether	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloroform	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Chloromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Dibromochloromethane	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	5.0	U	6		5.0	U	5.0	U	5.0	U
1,3-Dichlorobenzene	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
1,4-Dichlorobenzene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethane	7		7		5.0	U	5.0	U	5.0	U
1,2-Dichloroethane	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
1,1-Dichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,2-Dichloroethene (total)	29		20		8		21		5.0	U
1,2-Dichloropropane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Ethylbenzene	8		17		5.0	U	6		5.0	U
2-Hexanone	25	U	25	U	25	U	25	U	25	U
4-Methyl-2-pentanone (MIBK)	25	U	25	U	25	U	25	U	25	U
Methylene Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Styrene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Tetrachloroethene	5.0	UJ	5.0	U	5.0	U	5.0	U	5.0	U
Toluene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,1-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichloroethene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Trichlorofluoromethane	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Acetate	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
Vinyl Chloride	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
m,p-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
o-Xylene	5.0	U	5.0	U	5.0	U	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	44		50		8		27		0	
Dilution Factor:	1		1		1		1		1	
Date Sampled:	06/13/94		08/24/94		11/15/94		02/13/95		05/23/95	
Date Analyzed:	06/15/94		08/29/94		11/22/94		02/19/95		06/03/95	

TABLE C.3 Comparative Volatile Organic Compound Results for the FW Series Wells; Tinkham Garage MOM WQMP (1994-1997)

Monitoring Program Quarter:	Q6		Q7		Second Annual- Q9		Third Annual- Q13	
Season and Year:	Summer 1995		Fall 1995		Spring 1996		Spring 1997	
Well Location:	FW-21		FW-21		FW-21		FW-21	
GEI Sample ID:	92113-FW21-0895		92113-FW21-1195		92113-FW21-0596		92113-FW21-0597	
Laboratory Sample Number:	133958		138750		148402		8736.08	
Laboratory:	NET/Cambridge		NET/Cambridge		NET/Cambridge		Eastern Analytical, Inc.	
EPA Method 624 GC/MS VOCs (ug/L)	25 ml purge		25 ml purge					
Acetone	5.0	U	5.0	U	25	UJ	20	UJ
Benzene	1.0	U	1.0	U	5.0	U	5.0	U
Bromodichloromethane	1.0	U	1.0	U	5.0	U	5.0	U
Bromoform	1.0	U	1.0	U	5.0	U	5.0	U
Bromomethane	1.0	U	1.0	U	5.0	U	5.0	U
2-Butanone (MEK)	5.0	U	5.0	U	25	U	20	U
Carbon Disulfide	1.0	U	1.0	U	5.0	U	5.0	U
Carbon Tetrachloride	1.0	U	1.0	U	5.0	U	5.0	U
Chlorobenzene	1.0	U	1.0	U	5.0	U	5.0	U
Chloroethane	1.0	U	1.0	U	5.0	U	5.0	U
2-Chloroethylvinyl ether	1.0	U	1.0	U	5.0	U,R	5.0	U
Chloroform	1.0	U	1.0	U	5.0	U	5.0	U
Chloromethane	1.0	U	1.0	U	5.0	UJ	5.0	U
Dibromochloromethane	1.0	U	1.0	U	5.0	U	5.0	U
1,2-Dichlorobenzene	1.0	U	1.0	U	5.0	UJ	5.0	U
1,3-Dichlorobenzene	1.0	U	1.0	U	5.0	UJ	5.0	U
1,4-Dichlorobenzene	1.0	U	1.0	U	5.0	UJ	5.0	U
1,1-Dichloroethane	1.0	U	1.0	U	5.0	U	5.0	U
1,2-Dichloroethane	1.0	U	1.0	U	5.0	U	5.0	U
1,1-Dichloroethene	1.0	U	1.0	U	5.0	U	5.0	U
1,2-Dichloroethene (total)	1.0	U	1.0	U	5.0	U	5.0	U
1,2-Dichloropropane	1.0	U	1.0	U	5.0	U	5.0	U
cis-1,3-Dichloropropene	1.0	U	1.0	U	5.0	U	5.0	U
trans-1,3-Dichloropropene	1.0	U	1.0	U	5.0	U	5.0	U
Ethylbenzene	1.0	U	1.0	U	5.0	U	5.0	U
2-Hexanone	5.0	U	5.0	U	25	U	20	U
4-Methyl-2-pentanone (MIBK)	5.0	U	5.0	U	25	U	20	U
Methylene Chloride	1.0	U	1	U	5.0	U	5.0	U
Styrene	1.0	U	1.0	U	5.0	U	5.0	U
1,1,2,2-Tetrachloroethane	1.0	U	1.0	U	5.0	U	5.0	U
Tetrachloroethene	1.0	U	1.0	U	5.0	UJ	5.0	U
Toluene	1.0	U	1.0	U	5.0	U	5.0	U
1,1,1-Trichloroethane	1.0	U	1.0	U	5.0	U	5.0	U
1,1,2-Trichloroethane	1.0	U	1.0	U	5.0	U	5.0	U
Trichloroethene	1.0	U	1.0	U	5.0	U	5.0	U
Trichlorofluoromethane	1.0	U	1.0	U	5.0	UJ	5.0	U
Vinyl Acetate	1.0	U	1.0	U	5.0	U	5.0	U
Vinyl Chloride	1.0	U	1.0	U	5.0	U	5.0	U
m,p-Xylene	1.0	U	1.0	U	5.0	U	5.0	U
o-Xylene	1.0	U	1.0	U	5.0	U	5.0	U
TOTAL VOC CONCENTRATION (ug/L):	0		0		0		0	
Dilution Factor:	1		1		1		1	
Date Sampled:	08/17/95		11/14/95		05/16/96		05/14/97	
Date Analyzed:	08/29/95		11/21/95		05/23/96		05/16/97	

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES INC
67 SOUTH BEDFORD STREET
SUITE 101W
BURLINGTON, MASSACHUSETTS 01803 TEL: 781-270-6600 FAX: 781-270-9066

FILE COPY

March 16, 2005

Mr. Byron Mah
U.S. Environmental Protection Agency
One Congress Street
Suite 1100
HBO
Boston, Massachusetts 02114-2023

Mr. John Splendore, P.E.
NH Department of Environmental Services
Waste Management Division
29 Hazen Drive, P.O. Box 95
Concord, NH 03302-0095

Gentlemen:

On behalf of Cannons Sites Group PRP Committee, Roux Associates, Inc. (Roux Associates) is forwarding the results of our sampling of monitoring well FW-05. Monitoring well FW-05 is a shallow bedrock well located on Mercury Drive in Londonderry, New Hampshire.

On February 25, 2005, Roux Associates personnel sampled a groundwater sample from monitoring well FW-05. The sample was collected in general accordance with USEPA Low-Flow methodology. At the time of sample collection, all of the field parameters had stabilized. The groundwater sample was collected into three 40-ml VOA vials preserved with hydrochloric acid and transported to Eastern Analytical of Concord, New Hampshire. The samples were tested in accordance with USEPA Method 8260B.

Two volatile organic compounds were detected above the laboratory reporting limits: cis-1,2-dichloroethene at 6 ug/l and trichloroethene at 18 ug/l. The measured concentration of trichloroethene exceeds the screening level of 5 ug/l in Table 2 of EPA's <u>Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils</u> (November 2002). The laboratory report is attached.

In accordance with our work plan submitted on February 15, 2005 and approved on February 18, 2005, Roux Associates will perform the following activities:

> Roux Associates will install an overburden groundwater monitoring well, Roux-01, on the opposite side of Mercury Drive from FW-05. This location has been selected based on access. The approximate location of the monitoring well is shown on the attached figure for your approval.
>
> The boring for Roux-01 will be advanced using hollow-stem augers and will be continuously sampled. A two-inch monitoring well will be installed in the borehole and screened from 5 to 15 feet below ground surface. A sand pack will be placed around the well screen and the well pipe will be grouted with bentonite from the screened interval to the ground surface. We anticipate that the depth of this monitoring well will be at or in the immediate vicinity of the bedrock surface.
>
> Monitoring well Roux-01 will be developed following installation and subsequently sampled one week after development. Groundwater samples will be collected from Roux-01 in general accordance with EPA Low Flow protocols and tested by EPA Method 8260B.

It was agreed during our February 14th, 2005 meeting that no further vapor intrusion investigations will be required if VOC concentrations in Roux-01 are below the Table 2 values.

The Cannons Sites Group PRP Committee will propose further measures to assess the potential for vapor intrusion if VOC concentrations exceed the Table 2 values.

I will let you know the schedule as soon as we have obtained access to the area and contracted a driller to perform the work. Please contact me if you have any questions.

Sincerely,
ROUX ASSOCIATES, INC.

Ian Phillips, LSP
Principal Scientist

Attachments

cc: M. Walters, Cannons Sites Group
J. Tinkham

eastern analytical

professional laboratory services

Ian Phillips
Roux Associates
25 Corporate Drive, Suite 230
Burlington , MA 01803

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	46811
Client Identification:	Tinkham Garage / 111701M
Date Received:	2/25/2005

Dear Mr. Phillips :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. (EAI) certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.eailabs.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply throughout all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted

<:	"less than" followed by the detection limit
TNR:	Testing Not Requested
ND:	None Detected, no established detection limit
RL:	Reporting Limits
%R:	% Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269) and Vermont (VT1012).

This report package contains the following information: Sample Conditions summary, Analytical Results/Data and copies of the Chain of Custody.

Analytical Deviation & QA/QC Documentation:
Description of analytical deviations due to missed holding times, sample loss or other problems experienced during analyses are noted. Quality Assurance and Quality Control documentation not already reported directly on the final report is included. Problems that arose during analysis and corresponding resolutions to the problems encountered are addressed in the narrative.

If you have any questions regarding the results contained within, please feel free to directly contact me, or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample(s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw — 3-15-05 — 7

Lorraine Olashaw, Lab Director — Date — # of pages (excluding cover letter)

Eastern Analytical, Inc. 25 Chenell Drive, Concord, NH 03301 www.eailabs.com TEL 603 228-0525 1-800-287-0525 FAX 603 228-4591

SAMPLE CONDITIONS PAGE

Eastern Analytical, Inc. ID#: 46811

Client: **Roux Associates** Client Designation: **Tinkham Garage / 111701M**

Temperature upon receipt (°C): 6.1 **Received on ice or cold packs (Yes/No): Y**

Lab ID	SampleID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
46811.01	FW 05	2/25/05	2/25/05	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitibility, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 46811

Client: **Roux Associates** Client Designation: **Tinkham Garage / 111701M**

Sample ID:	FW 05
Lab Sample ID:	46811.01
Matrix:	aqueous
Date Sampled:	2/25/05
Date Received:	2/25/05
Units:	ug/l
Date of Analysis:	3/1/05
Analyst:	BAM
Method:	8260B
Dilution Factor:	1
Dichlorodifluoromethane	< 5
Chloromethane	< 5
Vinyl chloride	< 2
Bromomethane	< 2
Chloroethane	< 5
Trichlorofluoromethane	< 5
Diethyl Ether	< 5
Acetone	< 10
1,1-Dichloroethene	< 1
tert-Butyl Alcohol (TBA)	< 50
Methylene chloride	< 5
Carbon disulfide	< 5
Methyl-t-butyl ether(MTBE)	< 5
Ethyl-t-butyl ether(ETBE)	< 5
Isopropyl ether(DIPE)	< 5
tert-amyl methyl ether(TAME)	< 5
trans-1,2-Dichloroethene	< 2
1,1-Dichloroethane	< 2
2,2-Dichloropropane	< 2
cis-1,2-Dichloroethene	6
2-Butanone(MEK)	< 10
Bromochloromethane	< 2
Tetrahydrofuran(THF)	< 10
Chloroform	< 2
1,1,1-Trichloroethane	< 2
Carbon tetrachloride	< 2
1,1-Dichloropropene	< 2
Benzene	< 1
1,2-Dichloroethane	< 2
Trichloroethene	18
1,2-Dichloropropane	< 2
Dibromomethane	< 2
Bromodichloromethane	< 2
4-Methyl-2-pentanone(MIBK)	< 10
cis-1,3-Dichloropropene	< 2
Toluene	< 1
trans-1,3-Dichloropropene	< 2
1,1,2-Trichloroethane	< 2
2-Hexanone	< 10
Tetrachloroethene	< 2
1,3-Dichloropropane	< 2
Dibromochloromethane	< 2
1,2-Dibromoethane	< 2
Chlorobenzene	< 2
1,1,1,2-Tetrachloroethane	< 2
Ethylbenzene	< 1

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 46811

Client: Roux Associates

Client Designation: Tinkham Garage / 111701M

Sample ID:	FW 05
Lab Sample ID:	46811.01
Matrix:	aqueous
Date Sampled:	2/25/05
Date Received:	2/25/05
Units:	ug/l
Date of Analysis:	3/1/05
Analyst:	BAM
Method:	8260B
Dilution Factor:	1
mp-Xylene	< 1
o-Xylene	< 1
Styrene	< 1
Bromoform	< 2
IsoPropylbenzene	< 1
Bromobenzene	< 2
1,1,2,2-Tetrachloroethane	< 2
1,2,3-Trichloropropane	< 2
n-Propylbenzene	< 1
2-Chlorotoluene	< 2
4-Chlorotoluene	< 2
1,3,5-Trimethylbenzene	< 1
tert-Butylbenzene	< 1
1,2,4-Trimethylbenzene	< 1
sec-Butylbenzene	< 1
1,3-Dichlorobenzene	< 1
p-Isopropyltoluene	< 1
1,4-Dichlorobenzene	< 1
1,2-Dichlorobenzene	< 1
n-Butylbenzene	< 1
1,2-Dibromo-3-chloropropane	< 2
1,2,4-Trichlorobenzene	< 1
Hexachlorobutadiene	< 1
Naphthalene	< 5
1,2,3-Trichlorobenzene	< 1
4-Bromofluorobenzene (surr)	89 %R
1,2-Dichlorobenzene-d4 (surr)	107 %R

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 46811 **Batch ID:**

Client: **Roux Associates** Client Designation: **Tinkham Garage / 111701M**

QC Report

Parameter Name	Blank	LCS	LCS Dup	Units	Date of Analysis	Method
Dichlorodifluoromethane	< 5			ug/l	3/1/05	8260B
Chloromethane	< 5			ug/l	3/1/05	8260B
Vinyl chloride	< 2			ug/l	3/1/05	8260B
Bromomethane	< 2			ug/l	3/1/05	8260B
Chloroethane	< 5			ug/l	3/1/05	8260B
Trichlorofluoromethane	< 5			ug/l	3/1/05	8260B
Diethyl Ether	< 5			ug/l	3/1/05	8260B
Acetone	< 10			ug/l	3/1/05	8260B
1,1-Dichloroethene	< 1	20 (101 %R)	19 (93 %R) (8 RPD)	ug/l	3/1/05	8260B
tert-Butyl Alcohol (TBA)	< 50			ug/l	3/1/05	8260B
Methylene chloride	< 5			ug/l	3/1/05	8260B
Carbon disulfide	< 5			ug/l	3/1/05	8260B
Methyl-t-butyl ether(MTBE)	< 5			ug/l	3/1/05	8260B
Ethyl-t-butyl ether(ETBE)	< 5			ug/l	3/1/05	8260B
Isopropyl ether(DIPE)	< 5			ug/l	3/1/05	8260B
tert-amyl methyl ether(TAME)	< 5			ug/l	3/1/05	8260B
trans-1,2-Dichloroethene	< 2			ug/l	3/1/05	8260B
1,1-Dichloroethane	< 2			ug/l	3/1/05	8260B
2,2-Dichloropropane	< 2			ug/l	3/1/05	8260B
cis-1,2-Dichloroethene	< 2			ug/l	3/1/05	8260B
2-Butanone(MEK)	< 10			ug/l	3/1/05	8260B
Bromochloromethane	< 2			ug/l	3/1/05	8260B
Tetrahydrofuran(THF)	< 10			ug/l	3/1/05	8260B
Chloroform	< 2			ug/l	3/1/05	8260B
1,1,1-Trichloroethane	< 2			ug/l	3/1/05	8260B
Carbon tetrachloride	< 2			ug/l	3/1/05	8260B
1,1-Dichloropropene	< 2			ug/l	3/1/05	8260B
Benzene	< 1	20 (99 %R)	19 (95 %R) (4 RPD)	ug/l	3/1/05	8260B
1,2-Dichloroethane	< 2			ug/l	3/1/05	8260B
Trichloroethene	< 2	18 (91 %R)	17 (86 %R) (6 RPD)	ug/l	3/1/05	8260B
1,2-Dichloropropane	< 2			ug/l	3/1/05	8260B
Dibromomethane	< 2			ug/l	3/1/05	8260B
Bromodichloromethane	< 2			ug/l	3/1/05	8260B
4-Methyl-2-pentanone(MIBK)	< 10			ug/l	3/1/05	8260B
cis-1,3-Dichloropropene	< 2			ug/l	3/1/05	8260B
Toluene	< 1	21 (103 %R)	20 (98 %R) (5 RPD)	ug/l	3/1/05	8260B
trans-1,3-Dichloropropene	< 2			ug/l	3/1/05	8260B
1,1,2-Trichloroethane	< 2			ug/l	3/1/05	8260B
2-Hexanone	< 10			ug/l	3/1/05	8260B
Tetrachloroethene	< 2			ug/l	3/1/05	8260B
1,3-Dichloropropane	< 2			ug/l	3/1/05	8260B
Dibromochloromethane	< 2			ug/l	3/1/05	8260B
1,2-Dibromoethane	< 2			ug/l	3/1/05	8260B

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 46811 **Batch ID:**

Client: **Roux Associates** Client Designation: **Tinkham Garage / 111701M**

QC Report

Parameter Name	Blank	LCS	LCS Dup	Units	Date of Analysis	Method
Chlorobenzene	< 2	20 (101 %R)	20 (99 %R) (2 RPD)	ug/l	3/1/05	8260B
1,1,1,2-Tetrachloroethane	< 2			ug/l	3/1/05	8260B
Ethylbenzene	< 1			ug/l	3/1/05	8260B
mp-Xylene	< 1			ug/l	3/1/05	8260B
o-Xylene	< 1			ug/l	3/1/05	8260B
Styrene	< 1			ug/l	3/1/05	8260B
Bromoform	< 2			ug/l	3/1/05	8260B
IsoPropylbenzene	< 1			ug/l	3/1/05	8260B
Bromobenzene	< 2			ug/l	3/1/05	8260B
1,1,2,2-Tetrachloroethane	< 2			ug/l	3/1/05	8260B
1,2,3-Trichloropropane	< 2			ug/l	3/1/05	8260B
n-Propylbenzene	< 1			ug/l	3/1/05	8260B
2-Chlorotoluene	< 2			ug/l	3/1/05	8260B
4-Chlorotoluene	< 2			ug/l	3/1/05	8260B
1,3,5-Trimethylbenzene	< 1			ug/l	3/1/05	8260B
tert-Butylbenzene	< 1			ug/l	3/1/05	8260B
1,2,4-Trimethylbenzene	< 1			ug/l	3/1/05	8260B
sec-Butylbenzene	< 1			ug/l	3/1/05	8260B
1,3-Dichlorobenzene	< 1			ug/l	3/1/05	8260B
p-Isopropyltoluene	< 1			ug/l	3/1/05	8260B
1,4-Dichlorobenzene	< 1			ug/l	3/1/05	8260B
1,2-Dichlorobenzene	< 1			ug/l	3/1/05	8260B
n-Butylbenzene	< 1			ug/l	3/1/05	8260B
1,2-Dibromo-3-chloropropane	< 2			ug/l	3/1/05	8260B
1,2,4-Trichlorobenzene	< 1			ug/l	3/1/05	8260B
Hexachlorobutadiene	< 1			ug/l	3/1/05	8260B
Naphthalene	< 5			ug/l	3/1/05	8260B
1,2,3-Trichlorobenzene	< 1			ug/l	3/1/05	8260B
4-Bromofluorobenzene (surr)	89 %R	100 %R	99 %R	% Rec	3/1/05	8260B
1,2-Dichlorobenzene-d4 (surr)	104 %R	99 %R	99 %R	% Rec	3/1/05	8260B

LABORATORY REPORT

Eastern Analytical, Inc. ID#:46811 **Batch ID:**

Client: **Roux Associates** Client Designation: ***Tinkham Garage / 111701M***

Volatile Organic Compounds QC limits and Narrative Summary

	Solid	Aqueous
Matrix:	Solid	Aqueous
Units:	%	%
EPA Method	8260B	8260B
Surrogate Recovery		
4-Bromofluorobenzene	74-121	86-115
1,2-Dichlorobenzene-D4	80-120	80-120
Matrix Spike Recovery		
1,1-Dichloroethene	59-172	61-145
Trichloroethene	62-137	71-120
Benzene	66-142	76-127
Toluene	59-139	76-125
Chlorobenzene	60-133	75-130

Samples were extracted and analyzed within holding time limits.

Instrumentation was calibrated in accordance with the method requirements.

The method blanks were free of contamination at the reporting limits.

Sample surrogate recoveries met the above stated criteria.

The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.

There were no exceptions in the analyses, unless noted.

46811

ROUX

CHAIN OF CUSTODY

№ 01451 M

ROUX ASSOCIATES, INC.
Environmental Consulting & Management
25 CORPORATE DRIVE, SUITE 230
BURLINGTON, MASSACHUSETTS 01803
(781) 270-6600 FAX (781) 270-9066

ANALYSES PAGE OF

PROJECT NAME: Tinkham Garage
PROJECT NUMBER: 111701M
PROJECT LOCATION: Londonderry, VT
PROJECT MANAGER: Ian Phillips
SAMPLER(S): Lyndsey Colburn

SAMPLE DESIGNATION / LOCATION	DATE COLLECTED	TIME COLLECTED	SAMPLE MATRIX	8260B				TOTAL BOTTLES	NOTES
FW05	2/25/05	1235	GW	X				3	6.1°c on ice

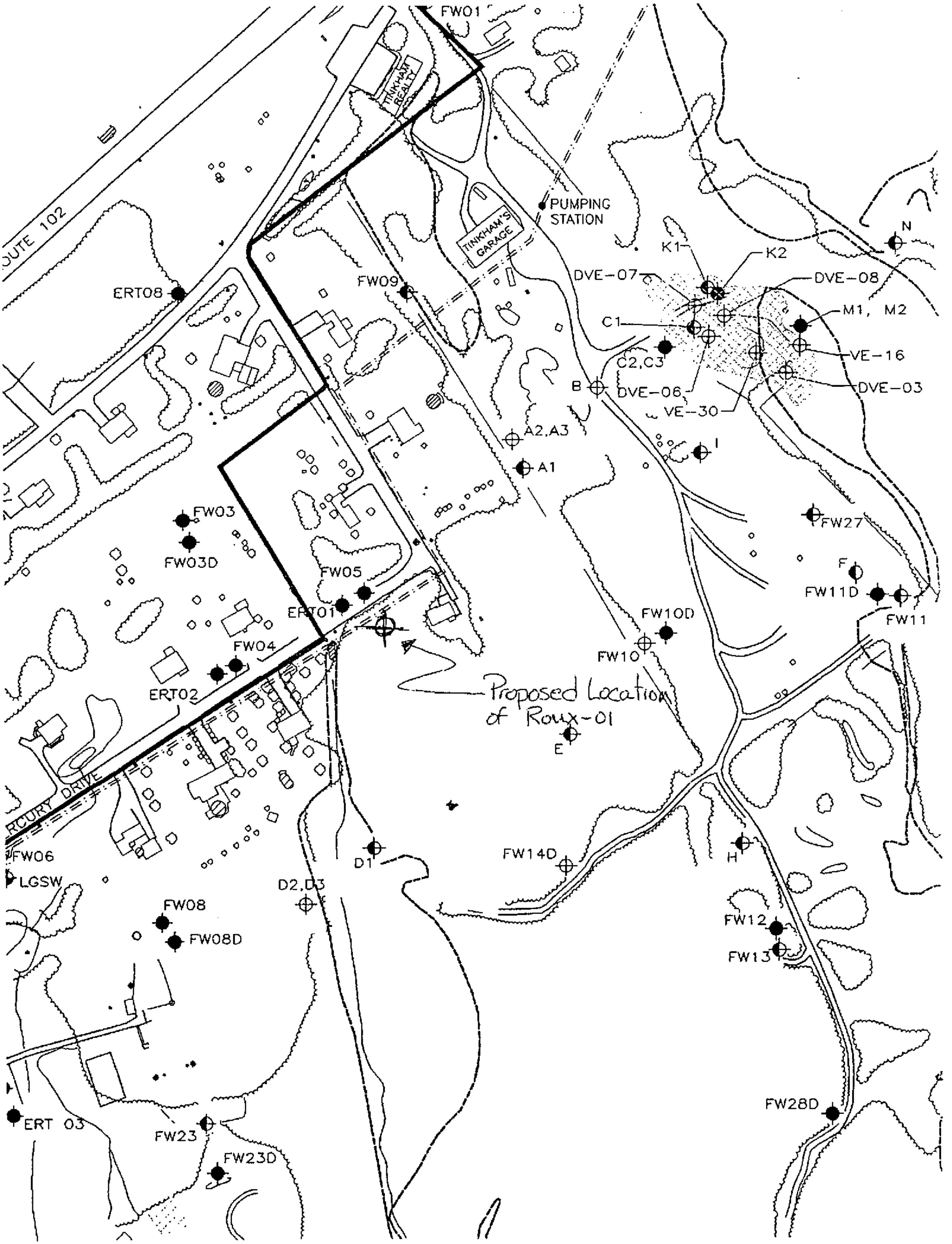
RELINQUISHED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)	FOR	DATE	TIME	SEAL INTACT Y OR N
[signature]	Roux	2/25/05	1230		R. Blood	EAI	2005 02.25	12:30	
R. Blood	EAI	2005 02.25	13:25		Dona McDougal	EAI	2/25/05	1325	

DELIVERY METHOD: Courier

COMMENTS: preserved on ice

ANALYTICAL LABORATORY: Eastern Analytical

CHAINOF.COR 12/LC93



FW01
TINKHAM REALTY
ROUTE 102
PUMPING STATION
TINKHAM'S GARAGE
N
K1
K2
DVE-07
DVE-08
M1, M2
C1
VE-16
C2,C3
B
DVE-06
DVE-03
VE-30
ERT08
FW09
A2,A3
A1
I
FW03
FW03D
FW27
F
FW05
FW11D
FW11
ERT01
FW10D
FW10
FW04
ERT02
Proposed Location of Roux-01
E
MERCURY DRIVE
FW06
LGSW
D1
FW14D
H
D2,D3
FW08
FW08D
FW12
FW13
FW28D
ERT 03
FW23
FW23D

ENVIRONMENTAL CONSULTING & MANAGEMENT
ROUX ASSOCIATES INC
ROUX
67 SOUTH BEDFORD STREET
SUITE 101W
BURLINGTON, MASSACHUSETTS 01803 TEL: 781-270-6600 FAX: 781-270-9066

FILE COPY

August 9, 2006

Mr. Byron Mah
U.S. Environmental Protection Agency
One Congress Street
Suite 1100
HBO
Boston, Massachusetts 02114-2023

Re: Sampling Results for Roux-1
Tinkham's Garage Superfund Site
Londonderry, New Hampshire

Dear Mr. Mah:

Roux Associates, Inc. (Roux Associates) has prepared this letter to transmit the results of the installation, sampling, and testing of monitoring well Roux-1 at the Tinkham's Garage Superfund Site in Londonderry, New Hampshire (the Site). The objective of the installation, sampling, and testing of monitoring well Roux-1 was to assess the potential for indoor air impacts from shallow groundwater.

No detectable volatile organic compounds were reported in the groundwater sample collected from Roux-1. Therefore, per our letter of March 16, 2005, no further vapor intrusion investigations are required. This conclusion was provided to you verbally in April 2005. Inadvertently, the final data were not forwarded to you and the New Hampshire Department of Environmental Services (DES) until today.

Investigation

On March 25, 2005, Roux Associates oversaw the boring advancement and installation of monitoring well Roux-1. Mr. Byron Mah was present. The approximate location of the monitoring well is shown on the attached figure.

The boring for Roux-1 was advanced using hollow-stem augers and was continuously sampled. Soil samples from each two-foot interval were placed in jars and the headspace was screened with an Organic Vapor Meter (OVM). The OVM was calibrated to 100 ppmv as benzene. No headspace readings were measured above 1.3 ppmv and no soil samples were collected for laboratory testing.

The soil was generally described as fine sand and silt. The soil became moist at approximately 6.5 feet below ground surface. The boring was advanced to refusal at a depth of approximately 13 feet below ground surface. Rock fragments were observed in the bottom of the split spoon. The boring log for Roux-1 is attached.

A two-inch monitoring well was installed in the borehole and screened from 7 to 13 feet below ground surface (bgs.). A sand pack was placed around the well screen and the well pipe was grouted with bentonite from five feet below ground surface to the ground surface. After installation, the depth to groundwater was recorded at 5.8 feet bgs.

On March 30, 2005, Roux-1 was developed with a whale pump. The well was pumped dry six times. A total of 21.5 gallons of water was purged from the well. At the end of the development, the groundwater was clear with no visible silt. The development water was discharged to the ground surface in the vicinity of the monitoring well.

On April 5, 2005, Roux Associates returned to the Site to collect a groundwater sample from Roux-1. Mr. Mah was also present at the time of sampling. The depth to water was 5.75 feet bgs. The groundwater sample from Roux-1 was collected in general accordance with EPA Low Flow protocols. The field records from the low flow sampling are attached and show that conditions had stabilized at the time of sampling. The sample was collected in two VOA vials and submitted on ice to Eastern Analytical, Inc. for testing by EPA Method 8260B.

Results

No volatile organic compounds were reported above the laboratory reporting limit in the groundwater sample from Roux-1. All quality control measures including the laboratory blank, laboratory control spike and spike duplicate samples, and sample surrogate recoveries met the method specific acceptance criteria. The laboratory report is attached.

Please contact me if you have any questions.

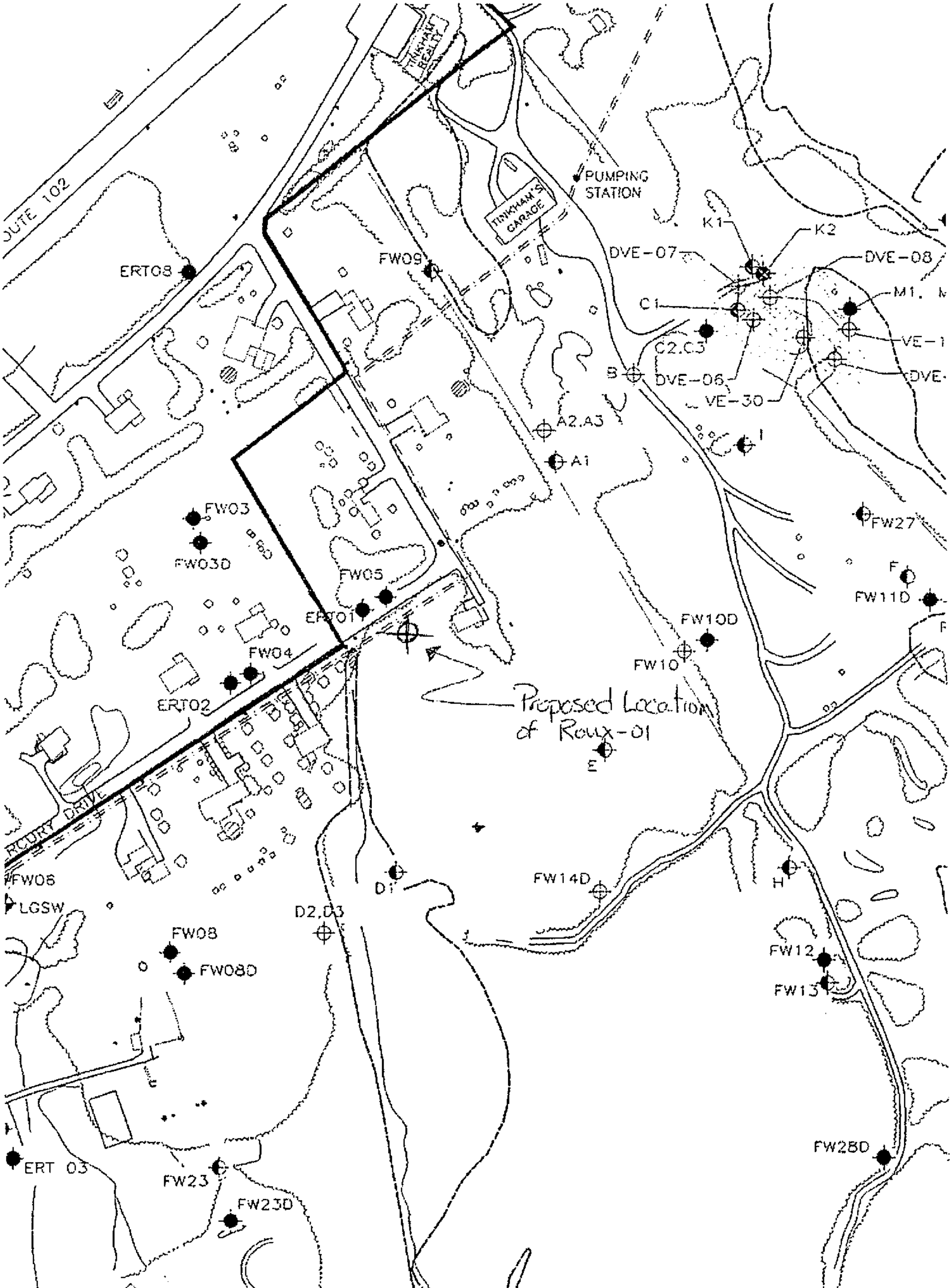
Sincerely,

ROUX ASSOCIATES, INC.

Ian Phillips, LSP
Principal Scientist

Attachments

cc: M. Walters, Cannons Sites Group



ROUTE 102
TINKHAM REALTY
PUMPING STATION
TINKHAM'S GARAGE
K1
K2
DVE-07
DVE-08
M1
C1
C2,C3
VE-30
DVE-06
B
ERT08
FW09
A2,A3
A1
I
FW27
F
FW11D
FW03
FW03D
FW05
ERT01
FW04
ERT02
FW10D
FW10
Proposed Location of Roux-01
E
MERCURY DRIVE
FW06
LGSW
D1
D2,D3
FW14D
H
FW08
FW08D
FW12
FW13
ERT 03
FW23
FW23D
FW28D

Client: Tinkham's Garage	Site:	Boring Diameter:		Boring/Well ID:	ROUX-01
Project No.: 1117011	(address) Mercury Dr	Total Depth of Boring:	13'	Initial Water Depth:	~7'
Drill Co.: NH Drilling	(city, state) Londonderry, NH	Well. Diam. & Material:	2"	Static Water Level:	
Drill Rig Type: D50	Start Date: 3/25/05	Screen Slot & Size:	~~2~~	Top of Casing Elev.:	23"
Drilling Method: Hollow Stem Auger	End Date: 3/25/05	Screened Interval(s):	72"	Ground Surface Elev.:	
Sample method: 2' split spoon	Logged By: ~~J. Perse~~ Kristen Blanton	Depth of Well (ft. bgs):	13'	Surface completion:	
	Checked By:				

Soil Description

Color PRIMARY UNIT, Minor Unit(s); inclusions (coal ash, bedrock frags., organics, etc.); Misc. Features (layers, seams, parting); Environmental Observations (staining, odor, etc.); Moisture.

Relative Percentages
"and" = 35 to 50%
"some" = 12 to 35%
"little" = 5 to 12%
"trace" = 0 to 5%

Roll Test for fine grained soils:
- If sample breaks easily it contains little clay (=SILT)
- If it can be rolled into a thread of 1/8" in diameter without breaking, it contains clay (=SILT/CLAY)
- If the thread can be rolled and re-rolled it likely contains mostly clay (=CLAY).

[additional comments in brackets: e.g. driller's comments, sample ID and notes, perched water table, etc]

Depth (feet)	Sample Interval (feet)	Blow Counts	Recovery Length (feet)	OVM/PID (ppm)	Soil Description	USCS Classification	Boring/Well Completion details	Depth (feet)
0–2		2, 4, 4, 4, [illegible]	19"	1.0	no rec 6" dk br organics - silt and fine sand 6" br fine sand, organic, red (iron) staining 7" dk br organic - fine sand and silt			0–2
2–4		5, 6, 4, 3	7"	0.2	no recovery 7" br fine sand, some silt			2–4
4–6		15, 32, 30, 25	15"	0	no recovery 15" lgt br/grey fine sand, trace coarse sand			4–6
6–8		38, 31, 27, 27	19"	0	no recovery 2" dk br organic fine sand and silt, wet 17" br fine sand, some silt, trace coarse sand, wet		wet	6–8
8–10		16, 24, 24, 24	18"	0	no recovery 18" br fine sand and silt w/ bands of packed silt, wet		wet	8–10
10–12		35, 54, 67, 100 ← hit refusal	22"	0	no recovery 10" br fine sand and silt, trace coarse sand, wet 12" br/red, dry, very hard packed silt and fine sand		perched water table?	10–12
12–14		50, 168, 160	12" for 4"	1.3	no recovery ← refusal 2" ~~dkbr~~ sand and silt, wet 10" br fine sand and silt (~~packed~~), dry 1" rock fragments (fill?)			12–14
14–20								14–20

Notes:

Boring/Well Construction Details

Casing | Sand Pack | Grout | Native Fill | Screen | Bentonite | Concrete | Bedrock

LOW FLOW SAMPLING FIELD FORM

Roux Associates, Inc. 25 Corporate Drive, Suite 230 Burlington, Massachusetts 01803

Well Number: Roux-1
Date: 4/5/05
Location/Site: Tinkham's Garage
Sampled by: L. Colburn
Project Number: 111701M
Site Description (Weather, Temp., etc.): Sunny, 45°

Depth to Top of Screen:
Depth to Bottom of Screen: ~~15~~ 14.95
Depth to Pump Intake: 12.95
Purging Device: peristaltic

TIME (24-hr)	Depth to Water (feet)	Purge Rate (ml/min)	Volume Purged (liters or gallons)	Temperature (°C)	Specific Conductance (µS/cm)	pH	ORP (mV)	Dissolved Oxygen (mg/L)	Turbidity (NTU)	Comments
800	5.75	100		6.02	160	5.74	214.5	12.37	9.87	
805		100		5.72	130	5.64	225.7	12.29	5.38	
810	5.89	100		5.76	131	5.69	222.2	12.05	5.56	
815		100		5.78	131	5.73	222.0	11.79	4.31	
820	5.89	100		5.76	131	5.73	222.0	11.75	3.76	
825		100		5.78	130	5.76	222.4	11.34	2.33	
830	5.91	100		5.95	131	5.79	220.7	11.35	1.98	
835	5.91	100		6.04	131	5.81	219.9	11.39	2.10	

Additional Comments: Collect sample at 835 to be analyzed for VOCs by 8260B

Field Parameter Stabilization	
Turbidity (> 5 NTU, 10% for values > 1 NTU)	Temp. (3%)
DO (10%)	pH (+/- 0.1 unit)
Specific Conductance (3%)	ORP/Eh (+/- 10 millivolts)

Purge Volumes						
Well Diameter	1	1.5	2	4	6	8
Gallons Per Foot	0.041	0.09	0.163	0.653	1.469	2.611

eastern analytical

professional laboratory services

Ian Phillips
Roux Associates
25 Corporate Drive, Suite 230
Burlington, MA 01803

RECEIVED
APR 26 2005
ROUX ASSOCIATES, INC.
MA OFFICE

Subject: Laboratory Report

Eastern Analytical, Inc. ID:	47332
Client Identification:	Tinkham's Garage / 111701M
Date Received:	4/5/2005

Dear Mr. Phillips :

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. (EAI) certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.eailabs.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply throughout all EAI reports:

Solid samples are reported on a dry weight basis, unless otherwise noted

- <: "less than" followed by the detection limit
- TNR: Testing Not Requested
- ND: None Detected, no established detection limit
- RL: Reporting Limits
- %R: % Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269) and Vermont (VT1012).

This report package contains the following information: Sample Conditions summary, Analytical Results/Data and copies of the Chain of Custody.

Analytical Deviation & QA/QC Documentation:
Description of analytical deviations due to missed holding times, sample loss or other problems experienced during analyses are noted. Quality Assurance and Quality Control documentation not already reported directly on the final report is included. Problems that arose during analysis and corresponding resolutions to the problems encountered are addressed in the narrative.

If you have any questions regarding the results contained within, please feel free to directly contact me, or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample(s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

Lorraine Olashaw

Lorraine Olashaw, Lab Director	4.20.05	7
	Date	# of pages (excluding cover letter)

SAMPLE CONDITIONS PAGE

Eastern Analytical, Inc. ID#: 47332

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

Temperature upon receipt (°C): 1.6 **Received on ice or cold packs (Yes/No): Y**

Lab ID	SampleID	Date Received	Date Sampled	Sample Matrix	% Dry Weight	Exceptions/Comments (other than thermal preservation)
47332.01	Roux-1	4/5/05	4/5/05	aqueous		Adheres to Sample Acceptance Policy

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitibility, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 47332

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

Sample ID:	Roux-1
Lab Sample ID:	47332.01
Matrix:	aqueous
Date Sampled:	4/5/05
Date Received:	4/5/05
Units:	ug/l
Date of Analysis:	4/6/05
Analyst:	BAM
Method:	8260B
Dilution Factor:	1
Dichlorodifluoromethane	< 5
Chloromethane	< 5
Vinyl chloride	< 2
Bromomethane	< 2
Chloroethane	< 5
Trichlorofluoromethane	< 5
Diethyl Ether	< 5
Acetone	< 10
1,1-Dichloroethene	< 1
tert-Butyl Alcohol (TBA)	< 50
Methylene chloride	< 5
Carbon disulfide	< 5
Methyl-t-butyl ether(MTBE)	< 5
Ethyl-t-butyl ether(ETBE)	< 5
Isopropyl ether(DIPE)	< 5
tert-amyl methyl ether(TAME)	< 5
trans-1,2-Dichloroethene	< 2
1,1-Dichloroethane	< 2
2,2-Dichloropropane	< 2
cis-1,2-Dichloroethene	< 2
2-Butanone(MEK)	< 10
Bromochloromethane	< 2
Tetrahydrofuran(THF)	< 10
Chloroform	< 2
1,1,1-Trichloroethane	< 2
Carbon tetrachloride	< 2
1,1-Dichloropropene	< 2
Benzene	< 1
1,2-Dichloroethane	< 2
Trichloroethene	< 2
1,2-Dichloropropane	< 2
Dibromomethane	< 2
Bromodichloromethane	< 2
4-Methyl-2-pentanone(MIBK)	< 10
cis-1,3-Dichloropropene	< 2
Toluene	< 1
trans-1,3-Dichloropropene	< 2
1,1,2-Trichloroethane	< 2
2-Hexanone	< 10
Tetrachloroethene	< 2
1,3-Dichloropropane	< 2
Dibromochloromethane	< 2
1,2-Dibromoethane	< 2
Chlorobenzene	< 2
1,1,1,2-Tetrachloroethane	< 2
Ethylbenzene	< 1

LABORATORY REPORT

Eastern Analytical, Inc. ID#: 47332

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

Sample ID:	Roux-1
Lab Sample ID:	47332.01
Matrix:	aqueous
Date Sampled:	4/5/05
Date Received:	4/5/05
Units:	ug/l
Date of Analysis:	4/6/05
Analyst:	BAM
Method:	8260B
Dilution Factor:	1
mp-Xylene	< 1
o-Xylene	< 1
Styrene	< 1
Bromoform	< 2
IsoPropylbenzene	< 1
Bromobenzene	< 2
1,1,2,2-Tetrachloroethane	< 2
1,2,3-Trichloropropane	< 2
n-Propylbenzene	< 1
2-Chlorotoluene	< 2
4-Chlorotoluene	< 2
1,3,5-Trimethylbenzene	< 1
tert-Butylbenzene	< 1
1,2,4-Trimethylbenzene	< 1
sec-Butylbenzene	< 1
1,3-Dichlorobenzene	< 1
p-Isopropyltoluene	< 1
1,4-Dichlorobenzene	< 1
1,2-Dichlorobenzene	< 1
n-Butylbenzene	< 1
1,2-Dibromo-3-chloropropane	< 2
1,2,4-Trichlorobenzene	< 1
Hexachlorobutadiene	< 1
Naphthalene	< 5
1,2,3-Trichlorobenzene	< 1
4-Bromofluorobenzene (surr)	**95 %R**
1,2-Dichlorobenzene-d4 (surr)	**100 %R**

LABORATORY REPORT

Eastern Analytical, Inc. ID#:47332 **Batch ID:**

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

QC Report

Parameter Name	Blank	LCS	LCS Dup	Units	Date of Analysis	Method
Dichlorodifluoromethane	< 5			ug/l	4/6/05	8260B
Chloromethane	< 5			ug/l	4/6/05	8260B
Vinyl chloride	< 2			ug/l	4/6/05	8260B
Bromomethane	< 2			ug/l	4/6/05	8260B
Chloroethane	< 5			ug/l	4/6/05	8260B
Trichlorofluoromethane	< 5			ug/l	4/6/05	8260B
Diethyl Ether	< 5			ug/l	4/6/05	8260B
Acetone	< 10			ug/l	4/6/05	8260B
1,1-Dichloroethene	< 1	16 (81 %R)	15 (77 %R) (5 RPD)	ug/l	4/6/05	8260B
tert-Butyl Alcohol (TBA)	< 50			ug/l	4/6/05	8260B
Methylene chloride	< 5			ug/l	4/6/05	8260B
Carbon disulfide	< 5			ug/l	4/6/05	8260B
Methyl-t-butyl ether(MTBE)	< 5			ug/l	4/6/05	8260B
Ethyl-t-butyl ether(ETBE)	< 5			ug/l	4/6/05	8260B
Isopropyl ether(DIPE)	< 5			ug/l	4/6/05	8260B
tert-amyl methyl ether(TAME)	< 5			ug/l	4/6/05	8260B
trans-1,2-Dichloroethene	< 2			ug/l	4/6/05	8260B
1,1-Dichloroethane	< 2			ug/l	4/6/05	8260B
2,2-Dichloropropane	< 2			ug/l	4/6/05	8260B
cis-1,2-Dichloroethene	< 2			ug/l	4/6/05	8260B
2-Butanone(MEK)	< 10			ug/l	4/6/05	8260B
Bromochloromethane	< 2			ug/l	4/6/05	8260B
Tetrahydrofuran(THF)	< 10			ug/l	4/6/05	8260B
Chloroform	< 2			ug/l	4/6/05	8260B
1,1,1-Trichloroethane	< 2			ug/l	4/6/05	8260B
Carbon tetrachloride	< 2			ug/l	4/6/05	8260B
1,1-Dichloropropene	< 2			ug/l	4/6/05	8260B
Benzene	< 1	18 (92 %R)	18 (92 %R) (0 RPD)	ug/l	4/6/05	8260B
1,2-Dichloroethane	< 2			ug/l	4/6/05	8260B
Trichloroethene	< 2	16 (78 %R)	16 (78 %R) (0 RPD)	ug/l	4/6/05	8260B
1,2-Dichloropropane	< 2			ug/l	4/6/05	8260B
Dibromomethane	< 2			ug/l	4/6/05	8260B
Bromodichloromethane	< 2			ug/l	4/6/05	8260B
4-Methyl-2-pentanone(MIBK)	< 10			ug/l	4/6/05	8260B
cis-1,3-Dichloropropene	< 2			ug/l	4/6/05	8260B
Toluene	< 1	21 (106 %R)	21 (106 %R) (0 RPD)	ug/l	4/6/05	8260B
trans-1,3-Dichloropropene	< 2			ug/l	4/6/05	8260B
1,1,2-Trichloroethane	< 2			ug/l	4/6/05	8260B
2-Hexanone	< 10			ug/l	4/6/05	8260B
Tetrachloroethene	< 2			ug/l	4/6/05	8260B
1,3-Dichloropropane	< 2			ug/l	4/6/05	8260B
Dibromochloromethane	< 2			ug/l	4/6/05	8260B
1,2-Dibromoethane	< 2			ug/l	4/6/05	8260B
Chlorobenzene	< 2	20 (102 %R)	21 (103 %R) (1 RPD)	ug/l	4/6/05	8260B

LABORATORY REPORT

Eastern Analytical, Inc. ID#:47332 **Batch ID:**

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

QC Report

Parameter Name	Blank	LCS	LCS Dup	Units	Date of Analysis	Method
1,1,1,2-Tetrachloroethane	< 2			ug/l	4/6/05	8260B
Ethylbenzene	< 1			ug/l	4/6/05	8260B
mp-Xylene	< 1			ug/l	4/6/05	8260B
o-Xylene	< 1			ug/l	4/6/05	8260B
Styrene	< 1			ug/l	4/6/05	8260B
Bromoform	< 2			ug/l	4/6/05	8260B
IsoPropylbenzene	< 1			ug/l	4/6/05	8260B
Bromobenzene	< 2			ug/l	4/6/05	8260B
1,1,2,2-Tetrachloroethane	< 2			ug/l	4/6/05	8260B
1,2,3-Trichloropropane	< 2			ug/l	4/6/05	8260B
n-Propylbenzene	< 1			ug/l	4/6/05	8260B
2-Chlorotoluene	< 2			ug/l	4/6/05	8260B
4-Chlorotoluene	< 2			ug/l	4/6/05	8260B
1,3,5-Trimethylbenzene	< 1			ug/l	4/6/05	8260B
tert-Butylbenzene	< 1			ug/l	4/6/05	8260B
1,2,4-Trimethylbenzene	< 1			ug/l	4/6/05	8260B
sec-Butylbenzene	< 1			ug/l	4/6/05	8260B
1,3-Dichlorobenzene	< 1			ug/l	4/6/05	8260B
p-Isopropyltoluene	< 1			ug/l	4/6/05	8260B
1,4-Dichlorobenzene	< 1			ug/l	4/6/05	8260B
1,2-Dichlorobenzene	< 1			ug/l	4/6/05	8260B
n-Butylbenzene	< 1			ug/l	4/6/05	8260B
1,2-Dibromo-3-chloropropane	< 2			ug/l	4/6/05	8260B
1,2,4-Trichlorobenzene	< 1			ug/l	4/6/05	8260B
Hexachlorobutadiene	< 1			ug/l	4/6/05	8260B
Naphthalene	< 5			ug/l	4/6/05	8260B
1,2,3-Trichlorobenzene	< 1			ug/l	4/6/05	8260B
4-Bromofluorobenzene (surr)	95 %R	100 %R	98 %R	% Rec	4/6/05	8260B
1,2-Dichlorobenzene-d4 (surr)	99 %R	98 %R	101 %R	% Rec	4/6/05	8260B

Eastern Analytical, Inc. ID#:47332 **Batch ID:**

Client: **Roux Associates** Client Designation: **Tinkham's Garage / 111701M**

Volatile Organic Compounds QC limits and Narrative Summary

Matrix:	Solid	Aqueous
Units:	%	%
EPA Method	8260B	8260B
Surrogate Recovery		
4-Bromofluorobenzene	74-121	86-115
1,2-Dichlorobenzene-D4	80-120	80-120
Matrix Spike Recovery		
1,1-Dichloroethene	59-172	61-145
Trichloroethene	62-137	71-120
Benzene	66-142	76-127
Toluene	59-139	76-125
Chlorobenzene	60-133	75-130

Samples were extracted and analyzed within holding time limits.

Instrumentation was calibrated in accordance with the method requirements.

The method blanks were free of contamination at the reporting limits.

Sample surrogate recoveries met the above stated criteria.

The associated matrix spikes and/or Laboratory Control Samples met acceptance criteria.

There were no exceptions in the analyses, unless noted.

CHAIN-OF-CUSTODY RECORD

REQUESTED ANALYSIS

Page ______ of ______

47332

ITEM # For Lab Use Only	SAMPLE I.D.	SAMPLING DATE/TIME	MATRIX	VOC							SVOC					METALS			INORGANICS													OTHER			# of Containers	NOTES MeOH Vial #
	ROUX-1	4/5/05 835	GW		X																														2	

PRESERVATIVE: H-HCl; N-HNO_3; S-H_2SO_4; Na-NaOH; M-MEOH

MATRIX: A-AIR S-SOIL GW-GROUND WATER SW-SURFACE WATER DW-DRINKING WATER WW-WASTE WATER ☐ OTHER

PROJECT MANAGER: Ian Phillips
COMPANY: Roux Associates
ADDRESS: 67 S. Bedford St, Suite 101W
CITY: Burlington STATE: MA ZIP: 01803
PHONE: 781-270-6600 EXT
FAX: 781-270-4066
E-MAIL: IPhillips@RouxInc.com
SITE NAME: Tinkhams Garage
PROJECT #: 11701M
STATE: ☒NH ☐MA* ☐ME ☐VT ☐OTHER
☐SITE INVESTIGATION ☒SITE REMEDIATION*
☐WASTE CHARACTERIZATION/PROFILE ☐SITE HISTORICALLY CONTAMINATED

☐8 RCRA METALS ☐FE, MN ☐13 PP METALS
OTHER METALS
DISSOLVED METALS FIELD FILTERED? ☐YES ☐NO
NOTES: (IE: SPECIAL DETECTION LIMITS, BILLING INFO. IF DIFFERENT)
Samples preserved on ice.

RESULTS NEEDED BY (ENTER PREFERRED DATE)
(GUARANTEED RAPID TURNAROUND NEEDS PRE-APPROVAL)
QA/QC REPORTING LEVEL: ☐A ☒B ☐C ☐MA DATA ENHANCEMENT PACKAGE*
REPORTING OPTIONS: ☒HARD COPY ☐FAX
ELECTRONIC: ☒E-MAIL ☐DISK

For Lab Use Only: Analyzed to EPA Protocol ☐Yes ☐No (see attached); Temp 1.6 °C; Ice? ☒Yes ☐No; Custody Seal Intact? ☐Yes ☐No

QUOTE #
P.O. #
SAMPLER(S): Lyndsey Colburn

RELINQUISHED BY	DATE	TIME	RECEIVED BY
Lyndsey Colburn	4/5/05	08:45	R. Blood
R. Blood	2005.04.05	12:50	Donna McDougal

eastern analytical, inc. professional laboratory services

25 Chenell Drive | Concord, NH 03301 | Tel: 603.228.0525 | 1.800.287.0525 | Fax: 603.228.4591 | E-Mail: customer_service@eailabs.com | www.eailabs.com

(WHITE: ORIGINAL GREEN: PROJECT MANAGER)

IV. TIER 1 - Primary Screening

Primary Screening is designed to help quickly screen out sites at which the vapor intrusion pathway does not ordinarily need further consideration, and point out the sites that do typically need further consideration. This evaluation involves determining whether any potential exists at a specific site for vapor intrusion to result in unacceptable indoor inhalation risks and, if so, whether immediate action may be warranted. Recommended criteria for making these determinations are presented in Questions 1 through 3, which focus on identifying:

a) if chemicals of sufficient volatility and toxicity are present or reasonably suspected to be present (Question 1);
b) if inhabited buildings are located (or will be constructed under future development scenarios – except for Environmental Indicator determinations, see section IV.C below) above or in close proximity to subsurface contamination (Question 2); and
c) if current conditions warrant immediate action (Question 3).

This primary screening process is illustrated in a flow diagram included in Appendix C.

A. Primary Screening – Question #1

Q1: Are chemicals of sufficient volatility and toxicity known or reasonably suspected to be present in the subsurface (e.g., in unsaturated soils, soil gas, or the uppermost portions of the ground water and/or capillary fringe – see Table 1)? (We recommend this consideration involve DQOs (see Appendix A) used in acquiring the site data as well as an appropriately scaled Conceptual Site Model (CSM) for vapor intrusion (see Appendix B).)

_✓_ If **YES** - check here, check off the relevant chemicals on Table 1, and continue with Question 2. The chemicals identified here (and any degradation products) are evaluated as constituents of potential concern in subsequent questions.

_____ If **NO** - check here, provide the rationale and references below, and then go to the Summary Page to document that the subsurface vapor to indoor air pathway is incomplete (i.e., no further consideration of this pathway is needed); or

_____ If sufficient data are not available, go to the Summary Page and document the need for more information. After collecting the necessary data, Question 1 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

1. What is the goal of this question?

This question is designed to help quickly screen out sites at which the vapor intrusion pathway generally does not need further consideration. This evaluation involves determining whether or not any potential exists at a specific site for the vapor intrusion pathway to result in unacceptable indoor air inhalation risks. Table 1 lists chemicals that may be found at hazardous waste sites and indicates whether, in our judgment, they are sufficiently volatile (Henry's Law Constant > 10^{-5} atm m^3/mol) to result in potentially significant vapor intrusion and sufficiently toxic (either an incremental lifetime cancer risk greater than 10^{-6} or a non-cancer hazard index greater than 1, or in some cases both) to result in potentially unacceptable indoor air inhalation risks. The approach used to develop Table 1 is documented in Appendix D and can be used, where appropriate, to evaluate volatile chemicals not included in the Table. We recommend that if any of the chemicals listed in Table 1 that are sufficiently volatile and toxic are present at a site, those chemicals become constituents of potential concern for the vapor intrusion pathway and are evaluated in subsequent questions in this guidance. If the chemicals listed in Table 1 are not present at a site, and no other volatile chemicals are present, we suggest that the vapor intrusion pathway be considered incomplete and no further consideration of this pathway is needed.

2. *What should you keep in mind?*

In evaluating the available site data, we recommend the DQOs used in collecting the data be reviewed to ensure those objectives are consistent with the DQOs for the vapor intrusion pathway (see Appendix A). We recommend the detection limits associated with the available groundwater data be reviewed to ensure they are not too high to detect volatile contaminants of potential concern. Also, we suggest that the adequacy of the definition of the nature and extent of contamination in groundwater and/or the vadose zone be assessed to ensure that all contaminants of concern and areas of contamination have been identified. Additionally, we recommend groundwater concentrations be measured or reasonably estimated using samples collected from wells screened at, or across the top of the water table. We recommend users read Appendices B (Conceptual Site Model for the Vapor Intrusion Pathway) and E (Relevant Methods and Techniques) to obtain a greater understanding of the important considerations in evaluating data for use in screening assessments of the vapor intrusion pathway.

3. ***Rationale and References:***

Contaminants of concern checked in Table 1 consist of all those detected at any concentration in groundwater less than 100 feet below ground surface. Data cited is from the Water Quality Management Plan data collected through 1997.

B. **Primary Screening – Question #2**

Q2: Are currently (or potentially) inhabited buildings or areas of concern under future development scenarios located *near* (see discussion below) subsurface contaminants found in Table 1?

__✓__ If **YES** – check here, identify buildings and/or areas of concern below, and document on the Summary Page whether the potential for impacts from the vapor intrusion pathway applies to currently inhabited buildings or areas of concern under reasonably anticipated future development scenarios, or both. (Note that for EI considerations, we recommend only current risks be evaluated.) Then proceed with Question 3.

_____ If **NO** – check here, describe the rationale below, and then go to the Summary Page to document that there is no potential for the vapor intrusion pathway to impact either currently inhabited buildings or areas of concern under future development scenarios (i.e., no further evaluation of this pathway is needed). (Note that for EI considerations, only current risks are evaluated.); or

_____ If sufficient data are not available – check here and document the need for more information on the Summary Page. After collecting the necessary data, Question 2 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

1. What is the goal of this question?

The goal of this question is to help determine whether inhabited buildings currently are located (or may be reasonably expected to be located under future development scenarios) above or in close proximity to subsurface contamination that potentially could result in unacceptable indoor air inhalation risks. If inhabited buildings and/or future development are not located "near" the area of concern, we suggest that the vapor intrusion pathway be considered incomplete and no further consideration of the pathway should be needed.

For the purposes of this question, **"inhabited buildings"** are structures with enclosed air space that are designed for human occupancy. Table 1, discussed above in Question 1, lists the **"subsurface contaminants demonstrating sufficient volatility and toxicity"** to potentially pose an inhalation risk. We recommend that an inhabited building generally be considered **"near"** subsurface contaminants if it is located within approximately 100 ft laterally or vertically of known or interpolated soil gas or groundwater contaminants listed in Table 1 (or others not included in table 1 – see Question 1) and the contamination occurs in the unsaturated zone and/or the uppermost saturated zone. If the source of contamination is groundwater, we recommend migration of the contaminant plume be considered when evaluating the potential for future risks. The distance suggested above (100 feet) may not be appropriate for all sites (or contaminants) and, consequently, we recommend that professional judgment be used when evaluating the potential for vertical and horizontal vapor migration.

2. *How did we develop the suggested distance?*

The recommended distance is designed to allow for the assessment to focus on buildings (or areas with the potential to be developed for human habitation) most likely to have a complete vapor intrusion pathway. Vapor concentrations generally decrease with increasing distance from a subsurface vapor source, and eventually at some distance the concentrations become negligible. The distance at which concentrations are negligible is a function of the mobility, toxicity and persistence of the chemical, as well as the geometry of the source, subsurface materials, and characteristics of the buildings of concern. Available information suggests that 100 feet laterally and vertically is a reasonable criterion when considering vapor migration fundamentals, typical sampling density, and uncertainty in defining the actual contaminant spatial distribution. The recommended lateral distance is supported by empirical data from Colorado sites where the vapor intrusion pathway has been evaluated. At these sites, no significant indoor air concentrations have been found in residences at a distance greater than one house lot (approximately 100 feet) from the interpolated edge of ground water plumes. Considering the nature of diffusive vapor transport and the typical anisotropy in soil permeability, in our judgment a similar criterion of 100 feet for vertical transport is generally conservative. These recommended distances will be re-evaluated and, if necessary, adjusted by EPA as additional empirical data are compiled.

3. *What should you keep in mind when evaluating this criterion?*

It is important to consider whether **significant preferential pathways** could allow vapors to migrate more than 100 feet laterally. For the purposes of this guidance, a "significant" preferential pathway is a naturally occurring or anthropogenic subsurface pathway that is expected to have a high gas permeability and be of sufficient volume and proximity to a building so that it may be reasonably anticipated to influence vapor intrusion into the building. Examples include fractures, macropores, utility conduits, and subsurface drains that intersect vapor sources or vapor migration pathways. Note that naturally occurring fractures and macropores may serve as preferential pathways for either vertical or horizontal vapor migration, whereas anthropogenic features such as utility conduits are relatively shallow features and would likely serve only as a preferential pathway for horizontal migration. In either case, we recommend that buildings with significant preferential pathways be evaluated even if they are further than 100 ft from the contamination.

We also recommend that the potential for mobile "vapor clouds" (gas plumes) emanating from near-surface sources of contamination into the subsurface be considered when evaluating site data. Examples of such mobile "vapor clouds" include: 1) those originating in landfills where methane may serve as a carrier gas; and 2) those originating in commercial/industrial settings (such as dry cleaning facilities) where vapor can be released within an enclosed space and the density of the chemicals' vapor may result in significant advective transport of the vapors downward through cracks/openings in floors and into the vadose zone. In these cases, diffusive transport of vapors is usually overridden by advective transport, and the vapors may be transported in the vadose zone several hundred feet from the source of contamination.

Finally, this guidance is intended to be applied to existing groundwater plumes as they are currently defined (e.g., MCLs, State Standards, or Risk-Based Concentrations). However, it is very important to recognize that some non-potable aquifers may have plumes that have been defined by threshold concentrations significantly higher than drinking-water concentrations. In these cases, contamination that is not technically considered part of the plume may still pose significant risks via the vapor intrusion pathway and, consequently, the plume definition may need to be expanded. Similarly, we recommend evaluating the technologies used to obtain soil gas and indoor air concentrations to determine if appropriate methods were used to ensure adequate data quality at the time analyses were conducted.

4. Identify Inhabited Buildings (or Areas With Potential for Future Residential Development) Within Distances of Possible Concern:

Residences along Mercury Drive, Constitution Drive and Capital Hill Drive are located within 100feet of contaminants in groundwater identified in Table 7.

C. **Primary Screening Stage-- Question #3**

Q3: Does evidence suggest immediate action may be warranted to mitigate current risks?

_____ If YES – check here and proceed with appropriate actions to verify or eliminate imminent risks. Some examples of actions may include but are not limited to indoor air quality monitoring, engineered containment or ventilation systems, or relocation of people. The action(s) should be appropriate for the site-specific situation.

_√_ If NO – check here and continue with Question 4.

1. What is the goal of this question?

This question is intended to help determine whether immediate action may be warranted for those buildings identified in Question 2 as located within the areas of concern. For the purposes of this guidance, "immediate action" means such action is necessary to verify or abate imminent and substantial threats to human health.

2. What are the qualitative criteria generally considered sufficient to indicate a need for immediate actions?

Odors reported by occupants, particularly if described as "chemical," or "solvent," or "gasoline." The presence of odors does not necessarily correspond to adverse health and/or safety impacts and the odors could be the result of indoor vapor sources; however, we believe it is generally prudent to investigate any reports of odors as the odor threshold for some chemicals exceeds their respective acceptable target breathing zone concentrations.

Physiological effects reported by occupants (dizziness, nausea, vomiting, confusion, etc.) may, or may not be due to subsurface vapor intrusion or even other indoor vapor sources, but, should generally be evaluated.

Wet basements, in areas **where chemicals of sufficient volatility and toxicity** (see Table 1) **are known to be present in groundwater and the water table is shallow enough that the basements are prone to groundwater intrusion or flooding.** This has been proven to be especially important where there is evidence of light, non-aqueous phase liquids (LNAPLs) floating on the water table directly below the building, and/or any direct evidence of contamination (liquid chemical or dissolved in water) inside the building.

Short-term safety concerns are known, or are reasonably suspected to exist, including: a) measured or likely explosive or acutely toxic concentrations of vapors in the building or connected utility conduits, sumps, or other subsurface drains directly connected to the building and b) measured or likely vapor concentrations that may be flammable/combustible, corrosive, or chemically reactive.

3. ***Rationale and Reference(s):***

None of the above-stated qualitative criteria have been observed at the Site.

V. TIER 2 - SECONDARY SCREENING

The vapor intrusion pathway is complex and, consequently, we recommend that a comprehensive assessment of this pathway using all available lines of evidence be conducted before drawing conclusions about the risks posed by this pathway. Users are encouraged to consider the evidence for vapor intrusion in sequential steps, starting with the source of vapors (contaminated groundwater or unsaturated soils), proceeding to soil gas in the unsaturated zone above the source, and upward to the exposure point (e.g., subslab or crawlspace vapor). Then, if indicated by the results of previous steps, collect and evaluate indoor air data. In our judgment, this sequential evaluation of independent lines of evidence provides a logical and cost-effective approach for identifying whether or not subsurface vapor intrusion is likely to contribute significantly to unacceptable indoor air quality. However, in those cases where indoor air quality data are available at the beginning of an evaluation, this guidance recognizes these data will generally be considered early in the process.

Collection of indoor air quality data without evidence to support the potential for vapor intrusion from subsurface sources can lead to confounding results. Indoor air quality can be influenced by 'background' levels of volatile chemicals. For example, consumer products typically found in the home (e.g., cleaners, paints, and glues) or occupant activities (e.g., craft hobbies, smoking) may serve as contributory sources of indoor air contaminants. Additionally, ambient (outdoor) air in urban areas often contains detectable concentrations of many volatile chemicals. In either case, the resulting indoor air concentrations can be similar to or higher than levels that are calculated to pose an unacceptable chronic inhalation risk in screening calculations. In fact, there may be dozens of detectable chemicals in indoor air even absent subsurface contributions. Thus, we recommend focusing the evaluation of existing indoor air data on constituents (and any potential degradation products) present in subsurface sources of contamination. We recommend considering the relative contributions of background sources (see Appendices E and I) in order to properly assess the potential inhalation exposure risks that can be attributed to the subsurface vapor intrusion pathway.

Using a sequential approach, the secondary screening suggested in this guidance involves comparing available measured or reasonably estimated concentrations of constituents of potential concern (identified in Question 1) in groundwater and/or soil gas to target concentrations identified in Questions 4 and 5. More detailed studies, including foundation and/or indoor air sampling and vapor intrusion modeling, are generally conducted in the site-specific assessment in Question 6. The sequential evaluation approach is illustrated in flow diagrams included in Appendix C. Question 4 uses conservative "generic" attenuation factors that reflect generally reasonable worst-case conditions for a first-pass screening of groundwater and soil gas data. Question 5 uses attenuation factors (based on a generally conservative use of the Johnson-Ettinger mathematical model) that relate groundwater and soil gas target concentrations to such site-specific conditions as depth of contamination and soil type. In performing the secondary screening assessment, the user will need to identify whether the contamination (source of vapors) occurs in groundwater or in the unsaturated zone. In our judgment, if there is a contaminant source in the unsaturated zone, soil gas data are needed to evaluate the vapor intrusion pathway in the vicinity of the unsaturated zone source. However, we recommend that groundwater data still be evaluated, particularly if the plume extends beyond an unsaturated zone source of vapors, but only in conjunction with soil gas data. If the secondary screening indicates the vapor intrusion pathway is complete, the guidance recommends the user perform a site-specific assessment following the guidelines in Question 6. If the secondary screening indicates this pathway is incomplete and/or does not pose an unacceptable risk to human health, then no further assessment of the pathway is recommended, unless conditions change.

The media-specific target concentrations used in Questions 4 and 5 were developed considering a generic conceptual model for vapor intrusion consisting of a groundwater and/or vadose zone source of volatile vapors that diffuse upwards through unsaturated soils towards the surface. Under the model, the soil in the vadose zone is considered to be relatively homogeneous and isotropic, though horizontal layers of soil types can be accommodated. The receptors at the surface used in the model are residents in homes with poured concrete foundations (e.g., basement or slab on grade foundations or crawlspace homes with a liner or other vapor barrier). The underlying assumption for this generic model is that site-specific subsurface characteristics will tend to reduce or attenuate vapor concentrations as vapors migrate upward from the source and into structures. Thus, application of the secondary screening target concentrations necessitates at least rudimentary knowledge of the contamination source, subsurface conditions (e.g., measured or reasonably estimated concentrations of target chemicals in soil or groundwater, and depth of contamination and soil type), and building construction at the site (e.g., foundation type). Specific factors that may result in unattenuated or enhanced transport of vapors towards a receptor, and consequently are likely to render the use of the secondary screening target concentrations inappropriate, are discussed in each question below. Factors such as biodegradation that can result in accelerated attenuation of vapors are not considered in the conceptual model. In general, it is recommended that the user consider whether the assumptions underlying the generic conceptual model are applicable at each site, and use professional judgment to make whatever adjustments (including not considering the model at all) are appropriate.

A. Secondary Screening – Question #4: Generic Screening

Q4(a): Are indoor air quality data available? (Collection of indoor air quality data without evidence to indicate the potential for vapor intrusion from subsurface sources is not recommended at this level of screening, but if such data are available, we recommend they be evaluated along with the available subsurface data.)

_____ If **YES** - check here and proceed to **Question 4(b).**

_√_ If **NO** – check here and proceed to **Subsurface Source Identification - Question 4(c).**

Q4(b): Do measured indoor air concentrations of constituents of potential concern identified in Question 1 (and any degradation products) exceed the target concentrations given in Tables 2(a), 2(b), or 2(c)?

_____ If YES - check here, document representative indoor air concentrations on Table 2, and **initiate a site-specific assessment** following the guidelines in Question 6. (We recommend the user also proceed with the subsurface evaluation to evaluate whether there is sufficient evidence to indicate the elevated indoor concentrations are due to vapor intrusion from subsurface sources, and not from background or other sources)

_____ If NO – check here and proceed to **Subsurface Source Identification - Question 4(c).** (Here, the recommendation to proceed with the subsurface evaluation is based on the assumption that only limited indoor air data are available and, therefore, the available subsurface data need to be evaluated to ensure that all possible areas potentially affected by the vapor intrusion pathway are evaluated. However, in our judgment, if the site has been adequately characterized and sufficient indoor air data are available (see Question 6 for a discussion of data needs), the **pathway is incomplete** and/or does not pose an unacceptable risk to human health, and no further assessment of the pathway is recommended. Document the finding as described in Question 6.)

Subsurface Source Identification:

Q4(c): Is there any potential contamination (source of vapors) in the unsaturated zone soil at any depth above the water table? (In our judgment, if there is a contaminant source in the unsaturated zone, soil gas data are needed to evaluate the vapor intrusion pathway in the vicinity of the source and, consequently, use of the groundwater target concentrations may be inappropriate. However, we recommend that groundwater data still be evaluated, particularly if a contaminant plume extends beyond the unsaturated zone source, but that the evaluation be performed only in conjunction with an evaluation of soil gas data. Other vapor sources that typically make the use of groundwater target concentrations inappropriate include: 1) those originating in landfills where methane may serve as a carrier gas; 2) those originating in commercial/industrial settings (such as dry cleaning facilities) where vapor can be released within an enclosed space and the density of the chemicals' vapor may result in significant advective transport of the vapors downward through cracks/openings in floors and into the vadose zone; and 3) leaking vapors from underground storage tanks. In these cases, diffusive transport of vapors is often overridden by advective transport and the vapors may be transported in the vadose zone several hundred feet from the source of contamination.)

_____ If YES-check here and skip to **Soil Gas Assessment - Question 4 (g)** below.

_√_ If **NO**- check here and continue with **Groundwater Assessment - Question 4(d)** below.

Groundwater Assessment:

Q4(d): Do measured or reasonably estimated groundwater concentrations exceed the generic target media-specific concentrations given in Tables 2(a), 2(b), or 2(c)? (For more information on the use of data for this part, please see the sections below entitled "How should data be used in this question?" and "How do you know you have unusable data?".)

_√_ If **YES** (or if the detection limit for any constituents of potential concern is above the target concentration) - check here and document representative groundwater concentrations on Table 2. If **soil gas data are available**, proceed to **Soil Gas Assessment - Question** 4(g) below, **otherwise** proceed to **Question 5.**

_____ If **NO** – check here and **proceed to Question 4(e).**

Q4(e): Is the **nature and extent of groundwater contamination adequately characterized** (see Appendices B & E) in areas with inhabited buildings (or areas *with the potential for future development of inhabited buildings*)?

_____ If **YES** - check here and continue with **Question 4(f)** below.

_____ If **NO** - check here, go to Summary Page and document that more information is needed. We recommend the next step be expeditious collection of the needed data in accordance with proper DQOs. Question 4 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

Q4(f): Are there site conditions and/or data limitations that make the use of the recommended generic groundwater attenuation factors inappropriate? We recommend this consideration involve comparison of the generic conceptual model to an appropriately scaled and updated Conceptual Site Model (CSM) for vapor intrusion (see Appendix B), as well as the proper DQOs (see Appendix A). We also recommend evaluation of the generic attenuation factors used to develop the media-specific attenuation factors (see the section below titled "What is in Tables 2(a), 2(b), and 2(c) and how did we develop them?" and Appendix F.)

Factors that, in our judgment, typically make the use of generic groundwater attenuation factors inappropriate include:

- ☐ Very shallow groundwater sources (e.g., depths to water less than 5 ft below foundation level); or
- ☐ Relatively shallow groundwater sources (e.g., depths to water less than 15 ft below foundation), and one or more of the following:

- buildings with significant openings to the subsurface (e.g., sumps, unlined crawlspaces, earthen floors), or
- significant preferential pathways, either naturally-occurring and/or anthropogenic (see discussion below under "What Should I Keep in Mind When Evaluating Data"), or
- buildings with very low air exchange rates (e.g., < 0.25/hr) or very high sustained indoor/outdoor pressure differentials (e.g., > 10 Pascals).

_____ If **YES** - check here, briefly document the issues below, and proceed to **Site-Specific Assessment - Question 6.**

_____ If **NO** - check here, briefly document the rationale below and document on the Summary Page that the groundwater data indicate the **pathway is incomplete** and/or does not pose an unacceptable risk to human health. In order to increase confidence in the assessment that the pathway is incomplete, we recommend that soil gas data **also** be evaluated (**Question 4(g)**).

_____ If sufficient data (of acceptable quality) are not available - check here, go to Summary Page and document that more information is needed. We recommend the next step be expeditious collection of the needed data in accord with proper DQOs. Question 4 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

Soil Gas Assessment:

Q4(g): Do measured or reasonably estimated soil gas concentrations exceed the generic target media-specific concentrations given in Tables 2(a), 2(b), or 2(c) (see Appendix D)? For more information on the use of data for this part, please see the section below entitled "How should data be used in this question?"

_____ If **YES** (*or if the detection limit for any constituents of potential concern is above the target concentration*) - check here. Document representative soil gas concentrations on Table 2 and proceed to **Question 5**.

_____ If **NO** – check here and proceed to **Question 4(h)**.

Q4(h): Is the **nature and extent of soil contamination adequately characterized** and has an adequate demonstration been made to show that the **soil gas sampling techniques used could reasonably detect an elevated concentration of vapors** if they were present in the site setting?

_____ If **YES** - check here and continue with **Question 4(i)** below.

_____ If **NO** - check here. Skip to Summary Page and document that more information is needed. We recommend the next step be expeditious collection of the needed data in accord with proper DQOs. Question 4 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

Q4(i): Are there site conditions and/or data limitations that may make the use of generic soil gas attenuation factors inappropriate? (We recommend that this consideration involve an appropriately scaled and updated Conceptual Site Model (CSM) for vapor intrusion (see Appendix B), as well as the proper DQOs (see Appendix A). We also recommend evaluation of the generic attenuation factors used to develop the media-specific attenuation factors (see the section below titled "What is in Tables 2(a), 2(b), and 2(c) and how did we develop them?" and Appendix F.))

Factors that, in our judgment, typically make the use of generic soil gas attenuation factors inappropriate include:

- ☐ Shallow soil contamination vapor sources (e.g., less than 15 ft below foundation level), and one or more of the following:
  - o buildings with significant openings to the subsurface (e.g., sumps, unlined crawlspaces, earthen floors), or
  - o significant preferential pathways, either naturally-occurring and/or anthropogenic (see discussion below under "What Should I Keep in Mind When Evaluating Data"), or
  - o buildings with very low air exchange rates (e.g., < 0.25/hr) or very high sustained indoor/outdoor pressure differentials (e.g., > 10 Pascals).

_____ If **YES** - check here, briefly document the issues below, and proceed to **Site-Specific Assessment - Question 6.**

_____ If **NO** - check here, briefly document the rationale below and document on the Summary Page that the soil gas data indicate the **pathway is incomplete** and/or does not pose an unacceptable risk to human health. In this case, no further assessment of the vapor intrusion pathway is recommended.

_____ If sufficient data (of acceptable quality) are not available - check here, go to Summary Page and document that more information is needed. We recommend the next step be expeditious collection of the needed data in accord with proper DQOs or proceed to **Question 5.** When additional data are collected, Question 4 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

1. What is the goal of this question?

Question 4 is intended to allow a rapid screening of available site data using measured or reasonably estimated groundwater and/or soil gas concentrations. The term "measured or reasonably estimated" is used above (and throughout this document) in recognition of the fact that measurements adjacent to or in all buildings of concern may not be practical or necessary. For example, groundwater concentrations beneath buildings are commonly estimated from concentrations collected in wells distributed about a larger area of interest.

2. *How should data be used in this question?*

Question 4 calls for comparison of site data with generic target media-specific concentrations given in Tables 2(a), 2(b), and 2(c). These target media-specific concentrations correspond to indoor air concentrations associated with a specific incremental lifetime cancer risk of (a) 10^{-4}, (b) 10^{-5}, (c) 10^{-6} or a hazard quotient greater than 1 (whichever is more restrictive). Under this question, the user selects the appropriate screening risk level for the site and compares the soil gas and/or groundwater concentrations observed at the site to the corresponding target media concentrations in the table. If the detection limit for any constituent of potential concern is above its target screening level, we recommend the user continue the evaluation as though the target level is exceeded.

In order to select the appropriate target media concentrations for comparison, it is important to identify whether a source of vapors in an area occurs in the unsaturated zone (contaminated soil). This allows the site data to be segregated into two categories: a) data representing areas where contaminated groundwater is the only source of contaminant vapors, and b) data representing areas where the underlying unsaturated zone soil contains a source of vapors. In case (a) either the groundwater or soil gas target concentrations in Tables 2(a), 2(b), or 2(c) are generally appropriate to use. In case (b), we recommend that only soil gas target concentrations and soil gas samples collected above the vapor source zone be used. This is because the groundwater target concentrations have been derived assuming no other vapor sources exist between the water table and the building foundation. However, we recommend that groundwater data still be evaluated, particularly if a contaminant plume extends beyond the unsaturated zone source, but the evaluation be performed only in conjunction with an evaluation of soil gas data. In either case, because of the complexity of the vapor intrusion pathway, we recommend that professional judgment be used when applying the target concentrations.

This screening approach is based on a conceptual model that assumes diffusive transport of vapors in the unsaturated zone. Consequently, we recommend the target concentrations used in this secondary screening not be applied to data from sites in which advection significantly influences vapor transport. Thus, the exclusionary criteria listed above in Questions 4(f) and 4(i) are designed to identify those situations in which advective vapor transport may result in unattenuated or enhanced vapor intrusion (e.g., shallow vapor sources at depths less than 15 ft below foundation level and buildings with significant openings to the subsurface, or very high sustained pressure differentials, or significant vertical preferential pathways).

3. *What is in Tables 2(a), 2(b), and 2(c) and how did we develop them?*

Tables 2(a), 2(b), or 2(c) contain generally recommended target concentrations for indoor air, soil gas, and groundwater for each chemical listed. A separate table is provided for each of the three cancer risk levels considered (a) 10^{-4}, (b) 10^{-5}, and (c) 10^{-6} including non-cancer risk values where applicable for Hazard Quotient = 1. Details regarding the derivation of Tables 2(a), 2(b), and 2(c) are provided in Appendix D. The tabulated indoor air concentrations are risk-based screening levels calculated following an approach consistent with EPA's ***Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites*** (EPA, 2002). These recommended target indoor air concentrations were calculated using toxicity information current as of the date indicated on the tables. The user is encouraged to visit the EPA web-page to determine whether updated tables are available.

The soil gas and groundwater target concentrations were calculated to correspond to the target indoor air concentrations using media-specific attenuation factors. Shallow soil gas (e.g., subslab gas and soil gas measured at 5 feet or less from the base of the foundation) is conservatively assumed to intrude into indoor spaces with an attenuation factor of 0.1. Note that in general samples taken less than 5 feet below the building foundation are not recommended unless the sample was taken from directly under the foundation slab or repeated sampling is performed to ensure a representative soil gas value. For deep soil gas (e.g., soil gas samples taken at depths greater than approximately 5 feet below the foundation level), an attenuation factor of 0.01 (generally considered reasonably conservative) is used to calculate target concentrations. For groundwater, an attenuation factor of 0.001 (generally considered reasonably conservative) is used in combination with the conservative assumption that the partitioning of chemicals between groundwater and soil vapor is assumed to obey Henry's Law. (Note that if the risk-based concentration calculated for groundwater falls below the chemical's MCL, the MCL is recommended as the target concentrations.) EPA generally considers the attenuation factors used in this guidance to be reasonable upper bound values based on data from sites where paired indoor air, soil gas and groundwater samples were available (see Appendix F), and also theoretical considerations.

4. *How do you know if you have usable data?*

In comparing available site data to the target media-specific target concentrations in Table 2, we recommend that DQOs used in collecting the data be consistent with DQOs for the vapor intrusion pathway and that the sampling issues specific to evaluating this pathway be considered (see Appendices A and E). Some examples of sampling issues that we recommend be considered are: 1) groundwater samples be taken from wells screened (preferably over short intervals) across the top of the water table (only volatile contaminants in the uppermost portions of an aquifer, including the capillary fringe, are likely to volatilize into the vadose zone and potentially migrate into indoor air spaces); 2) fluctuations in water table elevation can lead to elevated source vapor concentrations and thus, we recommend soil gas samples be considered in these areas; 3) we recommend soil gas samples be taken as close to the areas of interest as possible and preferably from directly underneath the building structure; and 4) as vapors are likely to migrate upward through the coarsest and/or driest material, we recommend that soil gas samples be collected from these materials. More detail regarding considerations for using groundwater and soil gas data to evaluate the vapor intrusion pathway are provided in Appendix E.

5. *What should I keep in mind when evaluating data?*

It is important to consider whether **significant preferential pathways** could allow vapors to migrate farther and at greater concentrations than expected. For purposes of this guidance, a preferential pathway is a naturally-occurring and/or anthropogenic subsurface 'pathway' that is expected to have a high intrinsic gas permeability (vadose zone) or high conductivity (saturated zone) and thus influence the flow or migration of contaminated vapors or groundwater. A preferential pathway is likely to have a significant influence on vapor intrusion if it is of sufficient volume and proximity to a currently occupied building so that it may be reasonably anticipated to influence the migration of contaminants to, or into, the building. Significant vertical preferential pathways may result in higher than anticipated concentrations in the overlying near surface soils, whereas significant horizontal preferential pathways may result in elevated concentrations in areas on the periphery of subsurface contamination. Naturally occurring preferential pathways may include fractured vadose zone geology or very permeable soils located between a relatively shallow source of contamination and a building. Anthropogenic preferential pathways may include utility conduits or subsurface drains that are directly connected to a building and a source of vapors. In highly developed residential areas, extensive networks of subsurface utility conduits could significantly influence the migration of contaminants. EPA recommends that buildings with significant preferential pathways be evaluated closely even if they are further than 100 feet from the contamination.

6. *What if I have bulk soil data?*

Soil (as opposed to soil gas) sampling and analysis is not currently recommended for assessing whether or not the vapor intrusion pathway is complete. This is because of the large uncertainties associated with measuring concentrations of volatile contaminants introduced during soil sampling, preservation, and chemical analysis, as well as the uncertainties associated with soil partitioning calculations. Thus, bulk soil target concentrations were not derived and the use of bulk soil target concentration is not generally recommended. Note however, if a NAPL source is suspected, a soil sample may be necessary to determine whether a NAPL source is present. Also, bulk soil concentration data could be used in a qualitative sense for delineation of sources, where appropriate. For example, high soil concentrations would indicate impacted soils; unfortunately, the converse is not always true and it is our judgment that non-detect analytical results can not be interpreted to indicate the absence of a vapor source.

7. *Rationale and Reference(s):*

Document Risk Level Used (Circle One): 10^{-4}, (b) 10^{-5}, or (c) 10^{-6}

Risk level 1×10^{-6} was used to determine whether concentrations exceed screening levels in groundwater. No source of vapors exists in soil in the vadose zone.

B. **Secondary Screening – Question #5:** Semi-Site Specific Screening

Q5(a): Do groundwater and/or soil gas concentrations for any constituents of potential concern exceed target media-specific concentrations by a factor greater than 50? (Evaluation of limited site data in Question 5 allows the user to potentially screen sites using target concentrations that are higher by a factor of up to 50 times greater than the generic target concentrations used in Question 4. If observed concentrations are greater than 50 times the generic target concentrations, we recommend expeditious site-specific evaluation.)

_____ If **YES** - check here and briefly document the issues below and go to **Site-Specific Assessment - Question 6.**

__√__ If **NO** - check here and continue with **Question 5(b).**

Q5(b): Are there site conditions and/or data limitations under which we would not recommend the use of semi-site specific attenuation factors (based on the Johnson-Ettinger Model)? (To determine whether use of the Johnson-Ettinger model is appropriate, we recommend the user consider an appropriately scaled and updated Conceptual Site Model (CSM) for vapor intrusion (see Appendix B) and DQOs (see Appendix A). We also recommend users refer to Appendix G, which lists the limitations of the Johnson-Ettinger Model.)

Factors that, in our judgment, typically make the use of semi-site specific attenuation factors inappropriate include:

- ☐ Very shallow vapor sources (e.g., depths less than 5 ft below foundation level); or
- ☐ Relatively shallow vapor sources (e.g., depths less than 15 ft below foundation level), and one or more of the following:
  - o buildings with significant openings to the subsurface (e.g., sumps, unlined crawlspaces, earthen floors), or
  - o significant preferential pathways, either naturally-occurring and/or anthropogenic (see discussion in Question 4), or
  - o buildings with very low air exchange rates (e.g., < 0.25/hr) or very high sustained indoor/outdoor pressure differentials (e.g., > 10 Pascals), or
  - o soil types outside the range shown in Table 4, or
- ☐ Any other situation for which the Johnson-Ettinger Model is deemed inappropriate.

_____ If **YES** - check here and briefly document the issues below and go to **Site-Specific Assessment - Question 6.**

__√__ If **NO** - check here and continue with **Question 5(c).**

_____ If sufficient data (of acceptable quality) are not available - check here and skip to Summary Page and document that more information is needed. We recommend that the next step be expeditious collection of the needed data in accord with proper DQOs. Question 5 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

Q5(c): Are the **depth to vapor source and the overlying unsaturated zone soil type adequately characterized** in areas with inhabited buildings (or areas with the potential for future development of inhabited buildings)?

_√_ If **YES** - check here and continue with **Question 5(d)** below.

_____ If **NO** - check here, go to Summary Page and document that more information is needed. We recommend the next step be expeditious collection of the needed data in accord with proper DQOs. Question 5 can then be revisited with the newly collected data to re-evaluate the completeness of the vapor intrusion pathway.

Subsurface Source Identification

Q5(d): Is there any potential contamination (source of vapors) in the unsaturated zone soil at any depth above the water table? (In our judgment, if there is a contaminant source in the unsaturated zone, soil gas data are needed to evaluate the vapor intrusion pathway in the vicinity of the source and, consequently, use of the groundwater target concentrations may be inappropriate. However, we recommend that groundwater data still be evaluated, particularly if a contaminant plume extends beyond the unsaturated zone source, but that the evaluation be performed only in conjunction with an evaluation of soil gas data. Other vapor sources that we believe typically make the use of groundwater target concentrations inappropriate include: 1) those originating in landfills where methane may serve as a carrier gas; 2) those originating in commercial/industrial settings (such as dry cleaning facilities) where vapor can be released within an enclosed space and the density of the chemicals' vapor may result in significant advective transport of the vapors downward through cracks/openings in floors and into the vadose zone; and 3) leaking vapors from underground storage tanks. In these cases, diffusive transport of vapors is often overridden by advective transport and the vapors may be transported in the vadose zone several hundred feet from the source of contamination.)

_____ If **YES** - check here and skip to **Soil Gas Assessment – Question 5(f)** below.

_√_ If **NO** - check here and continue with Groundwater Assessment - **Question 5(e)** below.

Groundwater Assessment:

Q5(e): Do measured or reasonably estimated groundwater concentrations exceed the target media-specific concentrations given in Tables 3(a), 3(b), or 3(c) for the appropriate attenuation factor (given that the conditions listed above in 5(b) are not present and that sampling issues described Appendix E have been considered)?

_____ If **YES** - check here, document the soil type, depth to groundwater and attenuation factor used in the assessment on the summary page, and document the representative groundwater concentrations on Table 3. If **soil gas data are available**, proceed to **Soil Gas Assessment - Question 5(f)** below, **otherwise** proceed to **Site Specific Assessment - Question 6**.

_____ If **NO** -- check here and document that the groundwater data indicate that the **pathway is incomplete** and/or does not pose an unacceptable risk to human health on the Summary Page. In order to increase confidence in the assessment that the pathway is incomplete, EPA recommends that soil gas data also be evaluated following the soil gas assessment guidelines below (**Question 5(f)**).

Soil Gas Assessment:

Q5(f): Do measured or reasonably estimated soil gas concentrations exceed the target media-specific concentrations given in Tables 3(a), 3(b), or 3(c) for the appropriate attenuation factor (given that the conditions listed above in 5(b) are not present, or that other site specific factors make consideration of this analysis inappropriate, and that sampling issues described in Appendix E have been considered)?

_____ If **YES** - check here, document the soil type, depth to source and attenuation factor used in the assessment on the summary page, document representative soil gas concentrations on Table 3 and proceed to **Site Specific Assessment - Question 6**.

_____ If **NO** -- check here and document that the subsurface vapor to indoor air **pathway is incomplete** and/or does not pose an unacceptable risk to human health on the Summary Page. In this case, we recommend no further assessment of the vapor intrusion pathway.

1. What is the goal of this question?

The goal of this question is to provide a means of evaluating the vapor intrusion pathway using tables of generally recommended target media-specific concentrations that incorporate limited site-specific information. Specifically, Question 5 factors in consideration of soil type and depth to source in screening the available groundwater and soil gas data. Soil gas- and groundwater-to-indoor air attenuation factors generally depend (as described in Appendix G) on building characteristics, chemical type, soil type, and depth of the source (which is defined as either a measured soil gas concentration at the specified sample collection depth below the building, or the ground water concentration at the depth of the water table). By using the Johnson and Ettinger Model (1991) and keeping all factors besides source depth and soil type constant (and reasonably conservative), a set of attenuation factors can be derived that allows for the selection of semi-site specific target media concentrations that are more representative of the user's site. The semi-site-specific target values provided in Question 5 are less conservative (higher by a factor of 2 to 50 times, depending on soil type and depth to source) than the generic screening values used in Question 4. The increase in target concentrations corresponds to a decrease in the calculated attenuation factors as depth to source increases and soil type becomes finer grained (see Figures 3(a) and (b) and Section 3 below). In our judgment, if observed concentrations are greater than 50 times the generic target concentrations provided in Question 4, there is no benefit in using the criteria in Question 5 and we recommend expeditious site-specific evaluation.

2. *How do you use the Graphs and the Tables?*

The user selects a representative attenuation factor for soil gas from Figure 3(a) and for groundwater from Figure 3(b) based on measured site-specific information about soil type and depth to source. The selected attenuation factors are then rounded up to the nearest attenuation factor shown in Figure 3. Then, the columns in Tables 3(a), 3(b), and 3(c) corresponding to the attenuation factors selected from Figure 3(a) or 3(b) can be used to determine the appropriate target media concentrations for this level of screening. The values in Tables 3(a), 3(b), and 3(c) were derived as discussed in Appendix D.

3. *How did we develop the media-specific target concentrations?*

The Johnson and Ettinger (1991) Model was used as described in Appendix G to calculate the attenuation factors shown in Figures 3(a) and 3(b). Generally reasonable building characteristics were selected and held constant in these calculations and the chemicals were assumed not to degrade. To capture the effect of changes in soil properties, the U.S. Soil Conservation Service (SCS) soil texture classifications were considered, and a subset of these was selected. This subset was chosen so that their relevant properties (porosity and moisture content) would collectively span the range of conditions most commonly encountered in the field. Then, plots of attenuation factor versus depth were calculated, and these results are presented in Figures 3(a) and 3(b). The two graphs are different because the soil gas attenuation factors (Figure 3(a)) do not have to account for transport across the capillary fringe whereas the groundwater attenuation factors (Figure 3(b)) do. Details of the input parameters and calculations used to derive the graphs are included in Appendix G.

4. *What should you keep in mind when using the graphs?*

The generally recommended depth to source used to select a scenario-specific attenuation factor is: 1) the vertical separation between the soil gas sampling point and the building foundation for use of Figure 3(a), or 2) the vertical separation between the water table and the building foundation for use of Figure 3(b). Note that we recommend that groundwater or soil gas samples collected at depths less than 5 feet (1.5 m) below the building foundation not be evaluated with these graphs. If contaminated groundwater is within 5 feet of the foundation level, or if the only soil gas samples available for screening were obtained from depths less than 5 feet below foundation level and the soil gas concentrations are greater than target levels, we recommend the user perform a site specific assessment. If the depth to source across the site varies, we recommend that the minimum depth be used in this assessment.

We recommend that the soil type used to select a scenario-specific attenuation factor represent the material most permeable to vapors between the building foundation and the contaminant source (e.g., the coarsest and/or driest soils). The graphs below use the U.S. Soil Conservation Service system of soil classification, in which the soil texture classes are based on the proportionate distribution of sand, silt and clay sized particles in soil. The generally preferred method for determining the SCS soil class is to use lithological information combined with the results of grain size distribution tests on selected soil samples. Table 4 below has been developed to assist users in selecting an appropriate SCS soil type in cases where lithological and grain size information is limited. Note that in Table 4 there is no soil texture class represented as consisting primarily of clay. Exclusion of clay was deliberate since homogenous unfractured clay deposits are rare.

Table 4. Guidance for selection of soil type curves in Figures 3(a) and 3(b).

If your boring log indicates that the following materials are the predominant soil types ...	Then we recommend the following texture classification when obtaining the attenuation factor.
Sand or Gravel or Sand and Gravel, with less than about 12 % fines, where "fines" are smaller than 0.075 mm in size.	Sand
Sand or Silty Sand, with about 12 % to 25 % fines	Loamy Sand
Silty Sand, with about 25 % to 50 % fines	Sandy Loam
Silt and Sand or Silty Sand or Clayey, Silty Sand or Sandy Silt or Clayey, Sandy Silt, with about 50 to 85 % fines	Loam

5. ***Rationale for Selecting Semi-Site Specific Attenuation Factor and Reference(s):***

Document Risk Level Used (Circle One): 10^{-4}, (b) 10^{-5}, or (c) 10^{-6}

Calculation of the Vapor Attenuation factor for the Site was based on a depth to groundwater of 8' in overburden wells and a sandy soil subsurface. As shown on the attached data table, at all locations where groundwater contaminant concentrations exceed 1×10^{-6} screening levels, contamination occurs in the bedrock aquifer. At each bedrock location exhibiting an exceedence of screening levels, an overburden couplet well exists and overburden groundwater data at these locations indicate concentrations do not exceed target screening levels.

The two locations at which exceedences of target screening levels occur in overburden or shallow bedrock are FW-05 and MP-1-S/R. For these locations, a risk level of 10^{-6} was used, and, for the reasons stated above, an attenuation factor of 2×10^{-4} was used. However, at location MP-1-3S/R, seven of the ten groundwater samples collected did not exhibit concentrations exceeding target screening levels. As shown on Table 1, a concentration of 6 ug/L was detected at MP-1-3S/R in Spring 1997, however, in the ~~six~~ previous sampling events concentrations of 1,2-Dichloroethane were below 5 ug/L, the target screening level. A concentration of 13 ug/L of Trichloroethene, which exceeds the screening level of 8 ug/L, was detected at location FW05. Monitoring well FW05 is a shallow bedrock well and is screened only in bedrock. At the upgradient location NAI-A1, which is screened only in the overburden, TCE has not been detected above 5 ug/L in the past five sampling events.

Table 1: Question 1 Summary Sheet.

CAS No.	Chemical	Is Chemical Sufficiently Toxic? [1]	Is Chemical Sufficiently Volatile? [2]	Check Here if Known or Reasonably Suspected To Be Present [3]
83329	Acenaphthene	YES	YES	
75070	Acetaldehyde	YES	YES	
67641	Acetone	YES	YES	
75058	Acetonitrile	YES	YES	
98862	Acetophenone	YES	YES	
107028	Acrolein	YES	YES	
107131	Acrylonitrile	YES	YES	
309002	Aldrin	YES	YES	
319846	alpha-HCH (alpha-BHC)	YES	YES	
62533	Aniline	YES	NO	NA
120127	Anthracene	NO	YES	NA
56553	Benz(a)anthracene	YES	NO	NA
100527	Benzaldehyde	YES	YES	
71432	Benzene	YES	YES	√
50328	Benzo(a)pyrene	YES	NO	NA
205992	Benzo(b)fluoranthene	YES	YES	
207089	Benzo(k)fluoranthene	NO	NO	NA
65850	Benzoic Acid	NO	NO	NA
100516	Benzyl alcohol	YES	NO	NA
100447	Benzylchloride	YES	YES	
91587	beta-Chloronaphthalene	YES	YES	
319857	beta-HCH (beta-BHC)	YES	NO	NA
92524	Biphenyl	YES	YES	
111444	Bis(2-chloroethyl)ether	YES	YES	
108601	Bis(2-chloroisopropyl)ether	YES	YES	
117817	Bis(2-ethylhexyl)phthalate	NO	NO	NA
542881	Bis(chloromethyl)ether	YES	YES	
75274	Bromodichloromethane	YES	YES	
75252	Bromoform	YES	YES	
106990	1,3-Butadiene	YES	YES	
71363	Butanol	YES	NO	NA
85687	Butyl benzyl phthalate	NO	NO	NA
86748	Carbazole	YES	NO	NA
75150	Carbon disulfide	YES	YES	
56235	Carbon tetrachloride	YES	YES	
57749	Chlordane	YES	YES	
126998	2-Chloro-1,3-butadiene (chloroprene)	YES	YES	
108907	Chlorobenzene	YES	YES	√
109693	1-Chlorobutane	YES	YES	
124481	Chlorodibromomethane	YES	YES	
75456	Chlorodifluoromethane	YES	YES	
75003	Chloroethane (ethyl chloride)	YES	YES	
67663	Chloroform	YES	YES	
95578	2-Chlorophenol	YES	YES	
75296	2-Chloropropane	YES	YES	
218019	Chrysene	YES	YES	
156592	cis-1,2-Dichloroethylene	YES	YES	
123739	Crotonaldehyde (2-butenal)	YES	YES	
98828	Cumene	YES	YES	
72548	DDD	YES	NO	NA
72559	DDE	YES	YES	
50293	DDT	YES	NO	NA
53703	Dibenz(a,h)anthracene	YES	NO	NA
132649	Dibenzofuran	YES	YES	
96128	1,2-Dibromo-3-chloropropane	YES	YES	
106934	1,2-Dibromoethane (ethylene dibromide)	YES	YES	
541731	1,3-Dichlorobenzene	YES	YES	
95501	1,2-Dichlorobenzene	YES	YES	√
106467	1,4-Dichlorobenzene	YES	YES	
91941	3,3-Dichlorobenzidine	YES	NO	NA
75718	Dichlorodifluoromethane	YES	YES	

Table 1: Question 1 Summary Sheet.

CAS No.	Chemical	Is Chemical Sufficiently Toxic? [1]	Is Chemical Sufficiently Volatile? [2]	Check Here if Known or Reasonably Suspected To Be Present [3]
75343	1,1-Dichloroethane	YES	YES	✓
107062	1,2-Dichloroethane	YES	YES	✓
75354	1,1-Dichloroethylene	YES	YES	
120832	2,4-Dichlorophenol	YES	NO	NA
78875	1,2-Dichloropropane	YES	YES	
542756	1,3-Dichloropropene	YES	YES	
60571	Dieldrin	YES	YES	
84662	Diethylphthalate	YES	NO	NA
105679	2,4-Dimethylphenol	YES	NO	NA
131113	Dimethylphthalate	NA	NO	NA
84742	Di-n-butyl phthalate	NO	NO	NA
534521	4,6-Dinitro-2-methylphenol (4,6-dinitro-o-cresol)	YES	NO	NA
51285	2,4-Dinitrophenol	YES	NO	NA
121142	2,4-Dinitrotoluene	YES	NO	NA
606202	2,6-Dinitrotoluene	YES	NO	NA
117840	Di-n-octyl phthalate	NO	YES	NA
115297	Endosulfan	YES	YES	
72208	Endrin	YES	NO	NA
106898	Epichlorohydrin	YES	YES	
60297	Ethyl ether	YES	YES	
141786	Ethylacetate	YES	YES	
100414	Ethylbenzene	YES	YES	✓
75218	Ethylene oxide	YES	YES	
97632	Ethylmethacrylate	YES	YES	
206440	Fluoranthene	NO	YES	NA
86737	Fluorene	YES	YES	
110009	Furan	YES	YES	
58899	gamma-HCH (Lindane)	YES	YES	
76448	Heptachlor	YES	YES	
1024573	Heptachlor epoxide	YES	NO	NA
87683	Hexachloro-1,3-butadiene	YES	YES	
118741	Hexachlorobenzene	YES	YES	
77474	Hexachlorocyclopentadiene	YES	YES	
67721	Hexachloroethane	YES	YES	
110543	Hexane	YES	YES	
74908	Hydrogen cyanide	YES	YES	
193395	Indeno(1,2,3-cd)pyrene	NO	NO	NA
78831	Isobutanol	YES	YES	
78591	Isophorone	YES	NO	NA
7439976	Mercury (elemental)	YES	YES	
126987	Methacrylonitrile	YES	YES	
72435	Methoxychlor	YES	YES	
79209	Methyl acetate	YES	YES	
96333	Methyl acrylate	YES	YES	
74839	Methyl bromide	YES	YES	
74873	Methyl chloride (chloromethane)	YES	YES	
108872	Methylcyclohexane	YES	YES	
74953	Methylene bromide	YES	YES	
75092	Methylene chloride	YES	YES	
78933	Methylethylketone (2-butanone)	YES	YES	
108101	Methylisobutylketone	YES	YES	
80626	Methylmethacrylate	YES	YES	
91576	2-Methylnaphthalene	YES	YES	
108394	3-Methylphenol (m-cresol)	YES	NO	NA
95487	2-Methylphenol (o-cresol)	YES	NO	NA
106455	4-Methylphenol (p-cresol)	YES	NO	NA
99081	m-Nitrotoluene	YES	NO	NA
1634044	MTBE	YES	YES	
108383	m-Xylene	YES	YES	
91203	Naphthalene	YES	YES	
104518	n-Butylbenzene	YES	YES	

Table 1: Question 1 Summary Sheet.

CAS No.	Chemical	Is Chemical Sufficiently Toxic? [1]	Is Chemical Sufficiently Volatile? [2]	Check Here if Known or Reasonably Suspected To Be Present [3]
98953	Nitrobenzene	YES	YES	
100027	4-Nitrophenol	YES	NO	NA
79469	2-Nitropropane	YES	YES	
924163	N-Nitroso-di-n-butylamine	YES	YES	
621647	N-Nitrosodi-n-propylamine	YES	NO	NA
86306	N-Nitrosodiphenylamine	YES	NO	NA
103651	n-Propylbenzene	YES	YES	
88722	o-Nitrotoluene	YES	YES	
95476	o-Xylene	YES	YES	
106478	p-Chloroaniline	YES	NO	NA
87865	Pentachlorophenol	YES	NO	NA
108952	Phenol	YES	NO	NA
99990	p-Nitrotoluene	YES	NO	NA
106423	p-Xylene	YES	YES	
129000	Pyrene	YES	YES	
110861	Pyridine	YES	NO	NA
135988	sec-Butylbenzene	YES	YES	
100425	Styrene	YES	YES	
98066	tert-Butylbenzene	YES	YES	
630206	1,1,1,2-Tetrachloroethane	YES	YES	
79345	1,1,2,2-Tetrachloroethane	YES	YES	
127184	Tetrachloroethylene	YES	YES	✓
108883	Toluene	YES	YES	
8001352	Toxaphene	YES	NO	NA
156605	trans-1,2-Dichloroethylene	YES	YES	
76131	1,1,2-Trichloro-1,2,2-trifluoroethane	YES	YES	
120821	1,2,4-Trichlorobenzene	YES	YES	
79005	1,1,2-Trichloroethane	YES	YES	
71556	1,1,1-Trichloroethane	YES	YES	
79016	Trichloroethylene	YES	YES	✓
75694	Trichlorofluoromethane	YES	YES	
95954	2,4,5-Trichlorophenol	YES	NO	NA
88062	2,4,6-Trichlorophenol	YES	NO	NA
96184	1,2,3-Trichloropropane	YES	YES	
95636	1,2,4-Trimethylbenzene	YES	YES	
108678	1,3,5-Trimethylbenzene	YES	YES	
108054	Vinyl acetate	YES	YES	
75014	Vinyl chloride (chloroethene)	YES	YES	✓

[1] A chemical is considered sufficiently toxic if the vapor concentration of the pure component (see Appendix D) poses an incremental lifetime cancer risk greater than 10^{-6} or a non-cancer hazard index greater than 1.

[2] A chemical is considered sufficiently volatile if its Henry's Law Constant is 1×10^{-5} atm-m^3/mol or greater (US EPA, 1991).

[3] Users should check off compounds that meet the criteria for toxicity and volatility and are known or reasonably suspected to be present.

Table 1: Comparison of Spring 1997 WQMP Groundwater Data with USEPA Screening Levels DRAFT

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
Depth = 0 - 50 feet								
NAI-A1	302.38	17	Overburden	4	Tetrachloroethene	<1.0	5	
					Trichloroethene	<1.0	5	
					1,2-Dichloroethane	<1.0	5	
					Vinyl Chloride	<1.0	2	
					1,1-Dichloroethane	<1.0	2200	
					Benzene	<1.0	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	<1.0	2600	
					Ethylbenzene	<1.0	700	
NAI-D1	272.62	7	Overburden	4	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW19	249.11	16.5	Overburden	7	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
7 rounds of no VOCs detected					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW18	252.93	18	Overburden	4	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
4 rounds of NO VOCs detected					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	

FW23 4 rounds of No VOCs detected

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
FW21	258.44	19.2	Overburden/Shallow Bedrock	9	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW21D)					1,2-Dichloroethane	<5.0	5	
2 rounds	of VC	<1			Vinyl Chloride	<5.0	2	
last 5 rounds	no VOCs	over	3 yr period		1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
MP-L-2D	271.55	21	Shallow Bedrock	12	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW03	291.91	23	Shallow Bedrock	4	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW03D)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
MP-I-3S/R	--	24.5	Shallow Bedrock	10	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	5[1]	5	5
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	**6.2**	5	20
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
MP-L-3S	262.57	24.5	Shallow Bedrock	4	Tetrachloroethene	NS	5	
					Trichloroethene	NS	5	
					1,2-Dichloroethane	NS	5	
					Vinyl Chloride	NS	2	
					1,1-Dichloroethane	NS	2200	
					Benzene	NS	5	
					Chlorobenzene	NS	390	
					1,2-Dichlorobenzene	NS	2600	
					Ethylbenzene	NS	700	
FW23	270.18	26.3	Overburden/Shallow Bedrock	4	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW23D)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW24	256.98	27	Overburden/Shallow Bedrock	7	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW24D)					1,2-Dichloroethane	<5.0	5	
No VOCs	last 4 rounds				Vinyl Chloride	<5.0	2	
1 round	of VC <1				1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW06	270.95	27.5	Shallow Bedrock	4	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
LGSW)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
FW16	256	28	Overburden/Shallow Bedrock	10	Tetrachlorcethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
ERT06)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	**6.3**	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	**6**	2600	
					Ethylbenzene	<5.0	700	
FW08	273.7	29.1	Shallow Bedrock	4	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW08D)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW04	283.38	30.1	Shallow Bedrock	10	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
ERT02)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW05	286.42	30.3	Shallow Bedrock	13	Tetrachloroethene	**1.5**	5	
(Couplet					Trichloroethene	13 [2]	5	5
ERT01)					1,2-Dichloroethane	<1.0	5	
					Vinyl Chloride	<1.0	2	
					1,1-Dichloroethane	<1.0	2200	
					Benzene	<1.0	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	<1.0	2600	
					Ethylbenzene	<1.0	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
FW17	233.27	42.7	Overburden/Shallow Bedrock	5	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
Depth = 50 - 100 feet								
ERT02	281.64	60	Intermediate Bedrock	10	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW04)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
ERT03	257.43	60	Intermediate Bedrock	5	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
ERT04	266.67	60	Intermediate Bedrock	4	Tetrachloroethene	<5.0	5	
					Trichloroethene	<5.0	5	
					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
ERT06	254.93	60	Intermediate Bedrock	13	Tetrachloroethene	<1.0	5	
(Couplet					Trichloroethene	<1.0	5	
FW16)					1,2-Dichloroethane	**2.7**	5	
					Vinyl Chloride	<1.0	2	
					1,1-Dichloroethane	**18**	2200	
					Benzene	<1.0	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	**10**	2600	
					Ethylbenzene	<1.0	700	
Depth = 100 feet and Over								
FW03D	291.14	102	Intermediate Bedrock	4	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW03)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW08D	274.12	102	Intermediate Bedrock	10	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW08)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
FW24D	258.23	205	Intermediate/Deep Bedrock	8	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW24)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	**2J**	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	**5J**	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
FW21D	257.45	205	Intermediate/Deep Bedrock	13	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW21)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	**3J**	2	
					1,1-Dichloroethane	**22**	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	**28**	2600	
					Ethylbenzene	**100**	700	
FW23D	260.77	205	Intermediate/Deep Bedrock	5	Tetrachloroethene	<5.0	5	
(Couplet					Trichloroethene	<5.0	5	
FW23)					1,2-Dichloroethane	<5.0	5	
					Vinyl Chloride	<5.0	2	
					1,1-Dichloroethane	<5.0	2200	
					Benzene	<5.0	5	
					Chlorobenzene	<5.0	390	
					1,2-Dichlorobenzene	<5.0	2600	
					Ethylbenzene	<5.0	700	
LGAW	252	300	Intermediate/Deep Bedrock	63	Tetrachloroethene	<1.0	5	
					Trichloroethene	<1.0	5	
					1,2-Dichloroethane	**1J**	5	
					Vinyl Chloride	<1.0	2	
					1,1-Dichloroethane	**7.6**	2200	
					Benzene	**1.1**	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	**5.2**	2600	
					Ethylbenzene	**1.6**	700	
LGSW	269.05	300	Intermediate/Deep Bedrock		Tetrachloroethene	<1.0	5	
(Couplet					Trichloroethene	**1.4**	5	
FW06)					1,2-Dichloroethane	**2.1**	5	
					Vinyl Chloride	**2.3**	2	
					1,1-Dichloroethane	**3.2**	2200	
					Benzene	**6.3**	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	<1.0	2600	
					Ethylbenzene	**2.3**	700	

Monitoring Well	TOC Elevation (NGVD)	Total Depth (ft.)	Well Type	Total # of Samples	Contaminant of Concern	Conc. as of 1997 (ug/L)	Screening Level (Table 2c, 10^{-6})	Target GW Concentration (Table 3c, 10^{-6})
ERT01	283.67	300	Intermediate/Deep Bedrock	13	Tetrachloroethene	<1.0	5	
(Couplet					Trichloroethene	16	5	
FW05)					1,2-Dichloroethane	<1.0	5	
					Vinyl Chloride	<1.0	2	
					1,1-Dichloroethane	2	2200	
					Benzene	<1.0	5	
					Chlorobenzene	<1.0	390	
					1,2-Dichlorobenzene	<1.0	2600	
					Ethylbenzene	<1.0	700	

[1] Seven out of the 10 samples collected at location MP-I-3S/R did not contain 1,2-Dichloroethane at concentrations above 5 ug/L.

[2] Samples collected at NAI-A1, an upgradient, overburden monitoring well, did not exhibit concentrations exceeding screening levels. The screened interval at FW05 is in bedrock and the screened interval at NAI-A1 is in the overburden.

Exceeds Generic Groundwater Screening Level, USEPA Indoor Air Guidance, Table 2c (Risk=$1x10^{-6}$)

Exceeds Groundwater Screening Level for Scenario-Specific Vapor Attenutation Factors, USEPA Indoor Air Guidance, Table 3c (Risk=$1x10^{-6}$)

Appendix B- Public Notice to Start Five-Year Review

68NH Roommates/Housing To Share NH

83 Professional

Derry News, Derry, NH, once a week, at intervals of not less than seven days, for three successive weeks, the last publication to be not less than fourteen (14) days before said First Tuesday of January 2009.

IT IS FURTHER ORDERED that said defendants, each of them, file in said office their plea, answer or demurrer, in writing to said petition and deliver a copy to David M. Groff, plaintiff's Attorney within thirty (30) days after said First Tuesday of January 2009; otherwise said petition shall be taken as confessed.

Attest:
Raymond Taylor
Clerk

The foregoing is a true copy of the order of notice in the above entitled matter.

Attest:
Raymond Taylor
Clerk

DN – 11/20, 11/27, 12/04/08

89 Trades/Industrial

93 General

at 7:00 p.m. in the Moose Hill Council Chambers, 268B Mammoth Road, Londonderry, NH to consider the following:

NEW PLAN/WORKSHOPS/PUBLIC HEARINGS/CONCEPTUAL DISCUSSIONS

7:00 Administrative Board Work

A. Crowells Corner Properties, LLC (Nutfield Publishing), Map 12, Lot 68 – Application Acceptance and Public Hearing for a Site Plan for a change in use from residential to commercial office.

B. Londonderry Historical Society, Map 6, Lot 18-1 – Public Hearing for amendments to Conditionally Approved Plan of the 1725 Proctor-Morrison-Parry House at the Londonderry Historical Society site.

C. Flexible Industrial District – Zoning Ordinance Amendments Public Hearing

D. Zoning Ordinance Amendments Workshop – Fence regulations requested by Building Division

E. Workforce Housing – Workshop Discussion

F. Claudette Adams – Conceptual Discussion

DN – 11/27/08

LEGAL NOTICE LEGAL NOTICE LEGAL NOTICE LEGAL NOTICE

EPA Starts Five-Year Review of Tinkham Garage Superfund Site

The U.S. Environmental Protection Agency (EPA) has begun its third Five-Year Review of the Tinkham Garage Superfund Site, Londonderry, NH. Five-Year Reviews are required by law and occur every five years. The reviews determine if the cleanup undertaken at a site is protective of human health and the environment. This Five-Year Review is expected to be completed by March 2009 and the results will be made publicly available.

The Tinkham Garage Superfund Site cleanup plan has included extension of municipal water and sewer lines to the surrounding area, on-site treatment by vacuum extraction and excavation of contaminated soils, and extraction and on-site pretreatment and off-site treatment of contaminated groundwater at the Town of Derry wastewater treatment works. Additional measures have also included monitoring of groundwater on-site and off-site.

Contaminants currently remaining at the site include Volatile Organic Compounds (VOCs), primarily in the groundwater underlying the site. Soil cleanup is complete. Groundwater monitoring will continue until cleanup is achieved.

More information about the cleanup can be found at www.epa.gov/ne/superfund/sites/tinkham or at the Leach Library, 276 Mammoth Road, Londonderry, NH 03053.

EPA
United States
Environmental Protection
Agency New England

For more information, contact:
Byron Mah Toll Free
1-888-372-7341, ext. 81249
mah.byron@epa.gov

98 Caregivers

$30; oak chest & bureau $55; porta crib $30. (978) 531-3526

ARIENS SNOWBLOWER & TORO SNOWBLOWER
2 stage 7 HP, 4 cycle Ariens 24 inch cut, electric and pull start, runs excellent, $300. Toro single stage 2 cycle, runs great, $150. 978-387-3137

AVON BEER STEINS,
30 steins, some with authenticity. $10, each.
(978) 979-4154

BATTERY POWER WHEELS, 2-seater, $100; battery big foot, 1 seater $80; horse on springs, antique $30. Jolly Jumper $15
603-898-5177

BICYCLE Suitcase, Peddle pack bicycle suitcase, perfect for shipping, $60.
(603) 363-4572

First Run

BOSE
3 2 1 SYSTEM excellent condition, hardly used, $1500
(978) 927-1086 after 2pm

BOXED ITEMS large selection of glass, collectibles, china, records, more, everything boxed-about 18 boxes, will sell by box or entire lot, box start at $15-$100. 603-493-2366.

102 Articles for Sale

& gold. $500. (603) 434-7132

FISHER PRICE GEOTRAX
Price reduced over 100 pieces of track 5 battery trains lots of large pieces over 270 pieces total $200 or best call 603-895-1437 leave message

FISH TANK
18 gallon, with wooden stand, $25/best offer.
(978) 434-6363

GALVANIZED FOLDING CHAIN LINK DOG CRATE excellent condition 48LX 30W x 34 H has one door, re moveable bottom tray
$100 call (978) 373-7927

GENERACK Generator, 6,250 watts, used little, $450. Craftsman table saw, 10", $110. (603) 887-4183

GENERATOR Honda 3500 EX Tuned-up & serviced, only 13 hours on engine, $600/best offer. (978) 582-2291

GOLD CHAIN 20", 14k, brand new, curb link (flat) diamond cut. $25 per gram. (approx. 30 grams). (978) 609-8228

HOSPITAL BED, Invacare manual, perfect condition, complete, half rails. $1200 firm. Call (603) 224-2640

LEGAL NOTICE LEGAL NOTICE

Notice is hereby given that due to non-payment of storage accounts, The household goods and property of Peter Genest and Robert Magee will be scheduled to be sold at private or public sale after 12/15/08. Seller reserves the right to reject any and all bids. Cash only. This notice will be published on 11/21/08 and 11/27/08.

ARROW SELF STORAGE
7 MOHAWK DRIVE
LONDONDERRY, NH 03053

DN – 11/20, 11/27/08

102 Articles for Sale

... dig. size 10.5, $25.
Call (978) 927-2904

SNOW BLOWER Ariens 24" 7hp, electric start, chains; old but runs ok, well maintained $60 603-898-5285 Salem, NH

SNOWBLOWER, Ariens, 7hp, electric start, hardly used, runs great. Brand new condition. $550. (978) 975-4080

SNOWBLOWER, Craftsman, 7 h.p., 24", electric start, runs great, $450. Ariens snowblower, 6 h.p., 24", electric start, runs great, $400. Call after 7 p.m., 603-898-9239.

SNOWBLOWER Craftsman 9hp, electric start, 27" path, Paid $950; sell for $400. Call 603-489-7633.

SNOWBLOWER, MTD, like new, 13hp, 33" cut, with headlight, electric start, also pull start, attached canopy, and wheelchains, $600 firm. (978) 556-3696

SNOWBLOWERS
Ariens $125 & Toro $50
Call Al 978-927-4474

SNOWBOARD- ABLE 5-100 with size 9 boots $100.
GLITTER- 5 pounds, various colors $50.
978 683 3816

SNOW THROWER
8hp, electric start, good engine, needs mechanical work, $75. (978) 683-3935

SPACE HEATER, Florence, $300. Must be seen!
Call (978) 455-7315

STEAM BUGGY - "As seen on TV" Carpet upholstery steam machine, also tile grout, stove tops, etc. dozen attachments, barely used. $70. Call (978) 443-2550.

... best offer (978) 373-7873 ask for Steve

48" OAK rolltop desk $150/best offer; antique oak desk chairs (2) $40 each; Thomas the Train table, tracks, trains & toys, chest $120/best offer. 603-329-4715

4 ASSEMBLED wooden utility carts plus bookcase & Kenmore microwave, $50. Call 508-423-6116.

102A Free Articles

COOKING RANGE - Is very good working condition. Showcase, perfectly good condition. Sofa, pretty good condition. ALL FREE! (603) 893-3490

CRAFT ITEMS, wooden, many sizes & shapes, new & ready for finishing, $10 for the box or best offer. (978) 475-8480

FREE REFRIGERATOR NEEDS CLEANING
(978) 886-0418

GARAGE DOOR opener, with 1 remote, $50. Or $100 installed. (978) 373-4448

RANGE - Electric, Amana, smooth top, black, large oven. Free. (603) 437-7688

VERY old refrigerator and also a freezer that are not frost free. They work great but are not pretty, good for a cellar for extra storage during holidays. 978-469-0442

25 Anna Lee
DOLLS
$20 each
Call (603) 362-0990

103 Household Goods

AIR BED, New, $175

BEDS! ALL NEW!!
Twins $140, Fulls $160
Queens $185, Kings $299
5pc Cherry Bedroom set
New in Boxes $599
603-566-3840

ANTIQUE BATHTUB
Great holiday gift!
Rare top flat roll, by Tony & Phillips Co. Claw foot, faucet and brass drain flip ring.
$849.99 (978) 324-4218

ANTIQUE DINING TABLE, black with mahogany top, has 2 leafs, open 4 ft., enclosed 2 ft., 3 ft. wide with 4 chairs. Ready to use or restore, $100. (978) 744-7126

APPLIANCES
$100 & UP, SHOWROOM:
48 FOSTER ST., PEABODY
delivery available 978-538-1880

ARMOIRE & 25" Magnavox TV, very good condition, $125
Call (978) 683-6380

ARMOIRE - Dark oak, to store clothing. Must condition. Paid $700; selling for $300. (978) 794-0608

ARMOIRE, solid oak, double doors, 73" tall x 53" wide x 24". Storage shelf on top, door on bottom, holds 42" plasma TV. $675 or best offer, Call 978-998-0904.

... round, one of a kind, 6 upholstered chairs, $375. Call 978-887-5285.

DINING ROOM set, light oak, table, 5 chairs, buffet & china closet $400/best. Dark pine dining room set, trestle table with 2 leafs, 5 chairs, hutch $400/best offer. (978) 463-8973

DINING ROOM SET oak, square table, 4 ladderback chairs, great condition, $475/best; swivel rocker $95, wing back chair $95; mauve upholstery, Thomasville. 978-420-6367

DINING ROOM SET - Pine. Large table, built in leafs, 5 chairs, hutch & buffet, only 2 years old. $400/best.
603-434-1388.

DINING ROOM SET, solid maple, 6 Windsor chairs, 1 leaf, seats 8 people. $375. Coffee table, 40" round, inlaid wood design. $125. Call (978) 495-1546.

DINING ROOM SET table & 6 chairs with 2 piece hutch, good condition, colonial style, oak stain, $300. (978) 687-0068

DINING ROOM SET, Walnut just in time for holidays, oval table, 6 chairs, hutch, $650 or best offer. (978) 474-8015

DINING ROOM TABLE & 3 matching chairs, dark wood, beautiful condition. $175
COFFEE TABLE, Gold leaf, round, glass top. $100.
(978) 774-7525

Dining Table with 4 chairs. French country style, warm oak & honey glazed creme with round slat backs $400 Call (603) 582-8822

LAMP TABLE ship style, excellent condition. $25.
Call (978) 683-4260

LEATHER COUCH & CHAIR WITH OTTOMAN, wingback chair. $75 each.
Call 617-828-3328

LIVING ROOM or den set, 4 pc. sofa set, 3 seat sofa, loveseat and 2 matching cushion chairs. Very good condition, originally $1850. Asking $450. (978) 476-9977

LOVE SEAT, 1950's, Victorian love seat, conversation piece, green velour, $350/best. (978) 687-4897

MATTRESS, Brand new, still in plastic, 1 queen double pillow top mattress $475. Call (603) 425-2090

MISSION BED, queen size, excellent condition, $150. 603-890-6137.

NEAR Salem State: bedroom set, 5 pieces with king headboard $300; washer & dryer $100; large A/C $75; freezer $50. 781-581-6363 or 617-974-8100;

NEAR Salem State, queen sleep sofa & love seat, green & yellow plaids, $100; entertainment center $50; leather recliner & foot rest $100; bar $50; 781-581-6363; 617-974-8100;

OLD MAPLE DRESSER, dovetailed joints, scratched top, otherwise good condition $150. (978) 768-7382

ORIENTAL RUG - handmade, 8x10, pink/green floral, recently cleaned $375.
Call 978-998-0904.

LEGAL NOTICE LEGAL NOTICE LEGAL NOTICE

Town of Londonderry, New Hampshire
LEGAL NOTICE OF PUBLIC HEARING ON ZONING ORDINANCE AMENDMENTS.

A public hearing will be held at the Moose Hill Council Chambers, 268B Mammoth Road on the 10th day of December, 2008, at 7:00 PM on proposed amendments to the Londonderry Zoning Ordinance and Zoning Map.

The proposed amendments were prepared by the Planning Department and Planning Board to amend the Permitted Use Table (Section 2.2) and Industrial District (Section 2.5) of the Ordinance. The proposed changes are a result of implementing the recommendations of both the 2004 Master Plan.

The proposed changes are summarized as follows:

- Amend the Permitted Use Table to add uses associated with the new Flexible Industrial District and add new Section 2.2.2, FI District Services Use Table.
- Amend Section 2.5, Industrial District to add new Section 2.5.1.2.3 – Flexible Industrial District.
- Amend Section 2.5, Industrial District to add new Section 2.5.3 – Flexible Industrial District (including the objectives & characteristics and standards of development within the new district).
- Amend the Zoning Map to rezone the following lots to the new FI District:
  - On Map 14: Lots 11, 26A, 26C, 26, 27, 28, 29, 29-1, 29-10, 29-11, 29-12, 29-13, 29-14, 29-15, 29-16, 19-17, 29-2, 29-3, 30, 31, 31-1, 32, 35 (I-II portion only), 36, 38, 39 (I-II portion only), 41, 42, 42-1, 42A, 43, 44-11, 44-2, 44-4, 44-5, 44-6, 44-7, 44-8, 45, 45-1, 45-2, 45A, 46, 47, 49 (I-II portion only).
  - On Map 17: Lots 2, 4 (HI portion only), 5-3, 5-4, 5-5, 5-8.
  - On Map 28: Lots 15, 17, 17-2, 17-3, 17-4, 18, 18-3, 18-4, 18-5, 18-6, 18-7, 25, 29-2, 29-3, 29-5, 29-6

Copies of the full text of the proposed amendments are available at the Planning Division, Second Floor of the Town Hall & on the Town Website www.londonderrynh.org (Click on Boards & Commissions, then Planning Board)

DN – 11/27/08

Appendix C- Site Inspection Checklist

Site Inspection Checklist

I. SITE INFORMATION	
Site name: Tinkham Garage	**Date of inspection: November 10, 2008**
Location and Region: Londonderry, NH	**EPA ID:** NHD062004569
Agency, office, or company leading the five-year review: USEPA	**Weather/temperature: Clear, 50 F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Michael Walters (Name) PRP Site Manager (Title) 11/10/08 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

2. **O&M staff** Ian Phillips (Name) Project Manager (Title) 11/10/08 (Date)
   Interviewed ☒ at site ☐ at office ☐ by phone Phone no. ______
   Problems, suggestions; ☐ Report attached ______

3. **Local regulatory authorities and response agencies** (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency USEPA
Contact Byron Mah — Remedial Project Manager — 11/10/08 — 617-918-1249
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached

Agency NHDES
Contact Thomas Andrews — Project Coordinator — 11/10/08 — 603-271-2910
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached

Agency
Contact
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached

Agency
Contact
Name — Title — Date — Phone no.
Problems; suggestions; ☐ Report attached

4. **Other interviews** (optional) ☐ Report attached.

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)			
1. O&M Documents			
☒ O&M manual	☒ Readily available	☒ Up to date	☐ N/A
☐ As-built drawings	☐ Readily available	☐ Up to date	☐ N/A
☐ Maintenance logs	☐ Readily available	☐ Up to date	☐ N/A
Remarks QAPP updated 5/11/07			
2. Site-Specific Health and Safety Plan	☒ Readily available	☒ Up to date	☐ N/A
Contingency plan/emergency response plan	☐ Readily available	☐ Up to date	☒ N/A
Remarks HASP updated 5/11/07			
3. O&M and OSHA Training Records	☒ Readily available	☒ Up to date	☐ N/A
Remarks			
4. Permits and Service Agreements			
☐ Air discharge permit	☐ Readily available	☐ Up to date	☐ N/A
☐ Effluent discharge	☐ Readily available	☐ Up to date	☐ N/A
☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☐ N/A
☒ Other permits	☒ Readily available	☒ Up to date	☐ N/A
Remarks Groundwater Management Permit Renewal dated 11/10/07			
5. Gas Generation Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks			
6. Settlement Monument Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks			
7. Groundwater Monitoring Records	☒ Readily available	☒ Up to date	☐ N/A
Remarks			
8. Leachate Extraction Records	☐ Readily available	☐ Up to date	☒ N/A
Remarks			
9. Discharge Compliance Records			
☐ Air	☐ Readily available	☐ Up to date	☒ N/A
☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
Remarks			
10. Daily Access/Security Logs	☐ Readily available	☐ Up to date	☒ N/A
Remarks			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for State
☐ PRP in-house ☒ Contractor for PRP
☐ Federal Facility in-house ☐ Contractor for Federal Facility
☐ Other______________________________

2. **O&M Cost Records**

☒ Readily available ☒ Up to date
☐ Funding mechanism/agreement in place
Original O&M cost estimate__________ ☐ Breakdown attached

Total annual cost by year for review period if available

From________ Date	To________ Date	________ Total cost	☐ Breakdown attached
From________ Date	To________ Date	________ Total cost	☐ Breakdown attached
From________ Date	To________ Date	________ Total cost	☐ Breakdown attached
From________ Date	To________ Date	________ Total cost	☐ Breakdown attached
From________ Date	To________ Date	________ Total cost	☐ Breakdown attached

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: None

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☐ Gates secured ☒ N/A

Remarks______________________________

B. Other Access Restrictions

1. ***Signs and other security measures*** ☐ Location shown on site map ☒ N/A

Remarks______________________________

C. Institutional Controls (ICs)		
1.	**Implementation and enforcement**	
	Site conditions imply ICs not properly implemented	☐ Yes ☒ No ☐ N/A
	Site conditions imply ICs not being fully enforced	☐ Yes ☒ No ☐ N/A
	Type of monitoring (*e.g.*, self-reporting, drive by) Groundwater Management Zone	
	Frequency Semiannual Groundwater monitoring; 5-year permit renewal	
	Responsible party/agency NHDES	
	Contact Thomas Andrews (Name) Project Coordinator (Title) 11/27/2007 (Date) 603-271-2910 (Phone no.)	
	Reporting is up-to-date	☒ Yes ☐ No ☐ N/A
	Reports are verified by the lead agency	☒ Yes ☐ No ☐ N/A
	Specific requirements in deed or decision documents have been met	☒ Yes ☐ No ☐ N/A
	Violations have been reported	☐ Yes ☒ No ☐ N/A
	Other problems or suggestions: ☐ Report attached	
2.	**Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A	
	Remarks	

D. General		
1.	**Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident	
	Remarks	
2.	**Land use changes on site** ☒ N/A	
	Remarks	
3.	**Land use changes off site** ☒ N/A	
	Remarks	

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A		
1.	**Roads damaged** ☐ Location shown on site map ☒ Roads adequate ☐ N/A	
	Remarks	

B. Other Site Conditions

Remarks ____

____

____

____

____

____

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1. **Settlement** (Low spots) ☐ Location shown on site map ☐ Settlement not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

2. **Cracks** ☐ Location shown on site map ☐ Cracking not evident
   Lengths____________ Widths___________ Depths__________
   Remarks____
   ____

3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

4. **Holes** ☐ Location shown on site map ☐ Holes not evident
   Areal extent______________ Depth____________
   Remarks____
   ____

5. **Vegetative Cover** ☐ Grass ☐ Cover properly established ☐ No signs of stress
   ☐ Trees/Shrubs (indicate size and locations on a diagram)
   Remarks____
   ____

6. **Alternative Cover (armored rock, concrete, etc.)** ☐ N/A
   Remarks____
   ____

7. **Bulges** ☐ Location shown on site map ☐ Bulges not evident
   Areal extent______________ Height____________
   Remarks____
   ____

8.	**Wet Areas/Water Damage** ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks________________	☐ Wet areas/water damage not evident ☐ Location shown on site map Areal extent________ ☐ Location shown on site map Areal extent________ ☐ Location shown on site map Areal extent________ ☐ Location shown on site map Areal extent________
9.	**Slope Instability** ☐ Slides ☐ Location shown on site map ☐ No evidence of slope instability Areal extent________ Remarks________________	
B. Benches	☐ Applicable ☐ N/A (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	
1.	**Flows Bypass Bench** Remarks________________	☐ Location shown on site map ☐ N/A or okay
2.	**Bench Breached** Remarks________________	☐ Location shown on site map ☐ N/A or okay
3.	**Bench Overtopped** Remarks________________	☐ Location shown on site map ☐ N/A or okay
C. Letdown Channels	☐ Applicable ☐ N/A (Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)	
1.	**Settlement** ☐ Location shown on site map ☐ No evidence of settlement Areal extent________ Depth________ Remarks________________	
2.	**Material Degradation** ☐ Location shown on site map ☐ No evidence of degradation Material type________ Areal extent________ Remarks________________	
3.	**Erosion** ☐ Location shown on site map ☐ No evidence of erosion Areal extent________ Depth________ Remarks________________	

4.	**Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting Areal extent______________ Depth____________ Remarks____	
5.	**Obstructions** Type____________________ ☐ No obstructions ☐ Location shown on site map Areal extent______________ Size____________ Remarks____	
6.	**Excessive Vegetative Growth** Type____________________ ☐ No evidence of excessive growth ☐ Vegetation in channels does not obstruct flow ☐ Location shown on site map Areal extent______________ Remarks____	
D. Cover Penetrations ☐ Applicable ☐ N/A		
1.	**Gas Vents** ☐ Active ☐ Passive ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____	
2.	**Gas Monitoring Probes** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____	
3.	**Monitoring Wells** (within surface area of landfill) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____	
4.	**Leachate Extraction Wells** ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A Remarks____	
5.	**Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A Remarks____	

E. Gas Collection and Treatment	☐ Applicable	☐ N/A
1. **Gas Treatment Facilities** ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse ☐ Good condition ☐ Needs Maintenance Remarks_______________		
2. **Gas Collection Wells, Manifolds and Piping** ☐ Good condition ☐ Needs Maintenance Remarks_______________		
3. **Gas Monitoring Facilities** (*e.g.*, gas monitoring of adjacent homes or buildings) ☐ Good condition ☐ Needs Maintenance ☐ N/A Remarks_______________		
F. Cover Drainage Layer	☐ Applicable	☐ N/A
1. **Outlet Pipes Inspected** Remarks_______________	☐ Functioning	☐ N/A
2. **Outlet Rock Inspected** Remarks_______________	☐ Functioning	☐ N/A
G. Detention/Sedimentation Ponds	☐ Applicable	☐ N/A
1. **Siltation** Areal extent_______ Depth_______ ☐ N/A ☐ Siltation not evident Remarks_______________		
2. **Erosion** Areal extent_______ Depth_______ ☐ Erosion not evident Remarks_______________		
3. **Outlet Works** ☐ Functioning ☐ N/A Remarks_______________		
4. **Dam** ☐ Functioning ☐ N/A Remarks_______________		

H. Retaining Walls	☐ Applicable ☐ N/A
1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident Horizontal displacement________ Vertical displacement________ Rotational displacement________ Remarks________	
2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident Remarks________	
I. Perimeter Ditches/Off-Site Discharge	☐ Applicable ☐ N/A
1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident Areal extent________ Depth________ Remarks________	
2. **Vegetative Growth** ☐ Location shown on site map ☐ N/A ☐ Vegetation does not impede flow Areal extent________ Type________ Remarks________	
3. **Erosion** ☐ Location shown on site map ☐ Erosion not evident Areal extent________ Depth________ Remarks________	
4. **Discharge Structure** ☐ Functioning ☐ N/A Remarks________	
VIII. VERTICAL BARRIER WALLS	☐ Applicable ☒ N/A
1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident Areal extent________ Depth________ Remarks________	
2. **Performance Monitoring** Type of monitoring________ ☐ Performance not monitored Frequency________ ☐ Evidence of breaching Head differential________ Remarks________	

IX. GROUNDWATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A
A. Groundwater Extraction Wells, Pumps, and Pipelines ☐ Applicable ☒ N/A
1. **Pumps, Wellhead Plumbing, and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☐ N/A Remarks
2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks
B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A
1. **Collection Structures, Pumps, and Electrical** ☐ Good condition ☐ Needs Maintenance Remarks
2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances** ☐ Good condition ☐ Needs Maintenance Remarks
3. **Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks

C. Treatment System ☐ Applicable ☒ N/A	
1.	**Treatment Train** (Check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation ☐ Air stripping ☐ Carbon adsorbers ☐ Filters____________ ☐ Additive (*e.g.*, chelation agent, flocculent)____________ ☐ Others____________ ☐ Good condition ☐ Needs Maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of groundwater treated annually____________ ☐ Quantity of surface water treated annually____________ Remarks____________
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks____________
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs Maintenance Remarks____________
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs Maintenance Remarks____________
5.	**Treatment Building(s)** ☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair ☐ Chemicals and equipment properly stored Remarks____________
6.	**Monitoring Wells** (pump and treatment remedy) ☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition ☐ All required wells located ☐ Needs Maintenance ☐ N/A Remarks____________
D. Monitoring Data	
1.	Monitoring Data ☐ Is routinely submitted on time ☐ Is of acceptable quality
2.	Monitoring data suggests: ☐ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

D. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☒ Properly secured/locked ☒ Functioning ☒ Routinely sampled ☒ Good condition
☒ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks All wells routinely monitored are locked. Locks on all additional monitoring wells will be verified.

X. OTHER REMEDIES

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

The remedy is Monitored Natural Attenuation along with institutional controls. Currently, concentrations of VOCs in groundwater throughout the Site are decreasing or are stable. The homes within the Site are on public water and a groundwater management permit meets the institutional controls requirement. The VOC groundwater plume is within the groundwater management zone.

B. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

The remedy remains protective. The parameters of the current groundwater monitoring program were expanded to include 1,4-dioxane as required by new provisions of the NHDES groundwater management permit. At this time, trends in the natural attenuation of 1,4-dioxane are unknown. However, initial indications are that 1,4-dioxane is within the GMZ.

C.	Early Indicators of Potential Remedy Problems
	Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs, that suggest that the protectiveness of the remedy may be compromised in the future. None
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. None identified

Content Checklist For
Five-Year Review Reports

This checklist may be used by you, your managers, etc., to verify that you have included all of the appropriate information in your Five-Year Review report. Depending on site-specific circumstances, some items may not be applicable. For example, a report for a site just beginning construction will generally contain less data than for a site that has reached construction completion.

General Report Format

- ☐ Signed concurrence memorandum (as appropriate)
- ☐ Title page with signature and date
- ☐ Completed five-year review summary form (page E-15)
- ☐ List of documents reviewed
- ☐ Site maps (as appropriate)
- ☐ List of tables and figures
- ☐ Interview report (as appropriate)
- ☐ Site inspection checklist
- ☐ Photos documenting site conditions (as appropriate)

Introduction

- ☐ The purpose of the five-year review
- ☐ Authority for conducting the five-year review
- ☐ Who conducted the five-year review (lead agency) and when
  - ☐ Organizations providing analyses in support of the review (*e.g.*, the contractor supporting the lead agency)
  - ☐ Other review participants or support agencies
- ☐ Review number (*e.g.*, first, second)
- ☐ Trigger action and date
- ☐ Number, description, and status of all operable units at the site
- ☐ If review covers only part of a site, explain approach
  - ☐ Define which areas are covered in the five-year review
  - ☐ Summarize the status of other areas of the site that are not covered in the present five-year

Site Chronology

- ☐ List all important site events and relevant dates (*e.g.*, date of initial discovery of problem, dates of pre-NPL responses, date of NPL listing, etc.)

Background

- ☐ General site description (*e.g.*, size, topography, and geology)
  - ☐ Former, current, and future land use(s) of the site and surrounding areas
  - ☐ History of contamination
  - ☐ Initial response (*e.g.*, removals)
  - ☐ Basis for taking remedial action (*e.g.*, contaminants)

Remedial Actions

Regulatory actions (*e.g.*, date and description of Records of Decision, Explanations of Significant Difference, Administrative Orders on Consent, Consent Decrees and Action Memorandum)

- ☐ Remedial action objectives
- ☐ Remedy description
- ☐ Remedy implementation (*e.g.*, status, history, enforcement actions, performance)
- ☐ Systems operations/Operations & Maintenance
  - ☐ Systems operations/O&M requirements
  - ☐ Systems operations/O&M operational summary (*e.g.*, history, modifications, problems, and successes)
  - ☐ Summary of costs of system operations/O&M effectiveness (*i.e.*, are requirements being met and are activities effective in maintaining the remedy?)

Progress Since Last Five-Year Review (if applicable)

- ☐ Protectiveness statements from last review
- ☐ Status of recommendations and follow-up actions from last review
- ☐ Results of implemented actions, including whether they achieved the intended effect
- ☐ Status of any other prior issues

Five-Year Review Process

- ☐ Administrative Components
- ☐ Notification of potentially interested parties of initiation of review process
- ☐ Identification of five-year review team members (as appropriate)
  - ☐ Outline of components and schedule of your five-year review
- ☐ Community Involvement
  - ☐ Community notification (prior and post review)
  - ☐ Other community involvement activities (*e.g.*, notices, fact sheets, etc., as appropriate)
- ☐ Document review
  - ☐ Data review
  - ☐ Site inspection
    - ☐ Inspection date
    - ☐ Inspection participants

Five-Year Review Process, cont'd.

- ☐ Site inspection scope and procedures
- ☐ Site inspection results, conclusions
- ☐ Inspection checklist
- ☐ Interviews
  - ☐ Interview date(s) and location(s)
  - ☐ Interview participants (name, title, etc.)
  - ☐ Interview documentation
  - ☐ Interview summary

Technical Assessment

☐ Answer Question A: Is the remedy functioning as intended by the decision documents?

- ☐ remedial action performance (*i.e.*, is the remedy operating as designed?)
- ☐ system operations/O&M
- ☐ cost of system operations/O&M
- ☐ opportunities for optimization
- ☐ early indicators of potential issues
- ☐ implementation of institutional controls and other measures

☐ Answer Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

- ☐ changes in standards, newly promulgated standards, TBCs
- ☐ expected progress towards meeting RAOs
- ☐ changes in exposure pathways
- ☐ changes in land use
- ☐ new contaminants and/or contaminant sources
- ☐ remedy byproducts
- ☐ changes in toxicity and other contaminant characteristics
- ☐ risk recalculation/assessment (as applicable)

☐ Answer Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

- ☐ new or previously unidentified ecological risks
- ☐ natural disaster impacts
- ☐ any other information that could call into question the protectiveness of the remedy

☐ Technical Assessment Summary

Issues

- ☐ Issues identified during the technical assessment and other five-year review activities
- ☐ Determination of whether issues affect current or future protectiveness

Issues, cont'd.

☐ A discussion of unresolved issues raised by support agencies and the community (States, Tribes, other Federal agencies, local governments, citizens, PRPs, other interested parties), if applicable

Recommendations and Follow-up Actions

☐ Required/suggested improvements to identified issues or to current site operations
☐ Note parties responsible for actions
☐ Note agency with oversight authority
☐ Schedule for completion of actions related to resolution of issues

Protectiveness Statements

☐ Protective statement(s) for each OU (If the remedy is not protective of human health and/or the environment, have you provided supporting discussion and information in the report to make this determination, such as current threats or level of risk?)
☐ Comprehensive protectiveness statement covering all of the remedies at the site (if applicable)

Next Review

☐ Expected date of next review

If five-year reviews will no longer be done, provide a summary of that portion of the technical analysis presented in the report that provides the rationale for discontinuation of five-year reviews.

Appendix D- Not Used

Appendix E
Technical Assessment of Groundwater Contamination

Tinkham Garage
Londonderry, New Hampshire
January 2009

ABSTRACT

A Technical Assessment was completed of the VOC contamination in groundwater at the Tinkham Garage Superfund Site. The Technical Assessment focused on whether the remedy was functioning as intended and the impact of the detections of 1,4-dioxane in groundwater may have on the protectiveness of the remedy. VOC concentrations in groundwater at the Site have shown an overall decrease. At many of the monitoring wells, VOC concentrations are less than the MCLs and concentration trends indicate that MCLs will be achieved in most of the source area monitoring wells within the 15 years (2018) of cessation of he groundwater extraction system in 2003. Monitoring wells that establish the boundaries of the Site and the GMZ (FW28D, ERT04, and FW25) continue to have no detectable concentrations of VOCs. Presently, no risk is posed to public health or the environment from VOCs at the Site. The detection of a new contaminant of concern, 1,4-dioxane, in the groundwater will require further assessment to verify that it has not migrated beyond the Site boundaries and is not impacting off-site private water supply wells near the Site.

E-1. Remedy Assessment

E-1.1 Introduction

To assess whether the remedy at the Site is functioning as intended, an assessment of the past five years of groundwater monitoring data was completed. The assessment of the monitoring data included three steps:

- Concentration data were compared with the results of the fate and transport model that predicted that concentrations throughout the Site would achieve EPA Maximum Concentration Levels (MCLs) within 15 years (2018) of cessation of the groundwater extraction system.
- Mann-Kendall (M-K) tests were completed to identify statistically significant concentration trends; and
- Concentration versus time graphs were prepared for each monitoring well in the monitoring program to visually inspect for trends and to calculate time to achieve MCLs, if appropriate.

In general, monitoring data from each of the monitoring wells indicate that VOCs in groundwater have already met the MCLs at several locations. Visual inspections and/or the Mann-Kendall (M-K) tests of VOC concentration trends in monitoring wells with current exceedences indicate that concentrations at these locations are generally decreasing and should meet the MCLs within the 15 year prediction (2018). However, based on current trends and simple regression analyses, several VOCs in several wells may require more than 15 years from pumping cessation to achieve MCL goals.

E-1.2 Monitoring Results

As noted above both statistical and visual evaluations of the VOC data were completed with data collected from 2004 through 2008. Previous groundwater monitoring data were not included in the analysis as these data are from before cessation of the groundwater extraction system in 2002 and significant property redevelopment activities in the immediate vicinity of the source area in 2002. **Table E-1** provides a summary of the assessment results of the monitoring data.

Statistical evaluations were completed by performing the M-K test for trends to determine the presence or absence of concentration trends at individual monitoring locations. The M-K test is a non-parametric test to identify statistically significant increasing or decreasing concentration trends (i.e., non-zero slopes). The M-K evaluations were completed using a spreadsheet developed by the State of Wisconsin Department of Natural Resources (DNR Form 4400215[2/2001]). The implementation of M-K test in the DNR spreadsheet requires a minimum of four (4) rounds of sampling results and is based on the methods presented in the DNR publication "Guidance on Natural Attenuation for Petroleum Releases" (2003).

The DNR spreadsheet may report three different results: 1) Increasing Trend at 80% and/or 90% confidence levels; 2) Decreasing Trends at 80% and/or 90% confidence levels; and 3) No Trend. If the DNR spreadsheet indicates a No Trend result, the coefficient of variation is calculated to assess the stability of the plume. If the coefficient of variation is less than one, the No Trend result indicates a stable plume. If the coefficient of variation is greater than one, the No Trend result indicates that the scatter in the data set is too large to provide a statistical conclusion regarding concentration trends. It should be noted that non-detect results were entered as ½ of the lowest detection limit reported in the data set as recommended by the DNR.A complete set of M-K analyses is provided in **Appendix E-A.**

Visual evaluations were completed by plotting concentration versus time for each VOC observed at each well to supplement the statistical test. The concentration versus time graphs provide a visual check of the conclusions of the M-K test particularly in the cases where no statistically significant trends were detected. A complete set of time versus concentration plots is provided in **Appendix E-A**.

Table E-1 Summary of Statistical and Visual VOC Concentration Trend Assessments

Well	Relative Location / Well Type	Contaminant	Achieved Attenuation Below MCL (as of May 2008)?	Mann-Kendall Result	Visual Trend
DVE3	Source Area Bedrock	Trichloroethene	Achieved	Stable	No Trend
		cis-1,2-dichloroethene	Achieved	Decreasing at 90%	Decreasing
		Vinyl chloride	Achieved	Stable	No Trend
		Benzene	Achieved	Stable	No Trend
DVE7*	Source Area	Trichloroethene	Not achieved	Not Stable	Decreasing
		cis-1,2-dichloroethene	Achieved	Not Stable	Decreasing
		Vinyl chloride	Achieved	Stable	No Trend
		Benzene	Achieved	Stable	No Trend
NAI-K2	Source Area Bedrock	Trichloroethene	Not achieved	Decreasing at 90%	Decreasing
		cis-1,2-dichloroethene	Not achieved	Decreasing at 90%	Decreasing
		Vinyl chloride	Not achieved	Decreasing at 90%	Decreasing
		Benzene	Achieved	Decreasing at 90%	Decreasing
NAI-M1	Source Area Bedrock	Trichloroethene	Not achieved	Increasing at 80% (No trend at 90%)	Decreasing
		cis-1,2-dichloroethene	Achieved	Stable	Decreasing
		Vinyl chloride	Achieved	Decreasing at 90%	Stable
		Benzene	Achieved	Stable	Stable
FW11D	Downgradient 360 feet Bedrock	Trichloroethene	Not achieved	Stable	Increasing
		cis-1,2-dichloroethene	Achieved	Increasing at 90%	Increasing
		Vinyl chloride	Not achieved	Increasing at 90%	Increasing
		Benzene	Achieved	Increasing at 90%	Increasing
FW20	Downgradient 360 feet Overburden	Trichloroethene	Achieved	Stable	Stable/Decreasing
		cis-1,2-dichloroethene	Achieved	Stable	Stable/Decreasing
		Vinyl chloride	Not achieved	Stable	Stable/Decreasing
		Benzene	Achieved	Stable	Stable/Decreasing
OW2D	Downgradient 525 feet Overburden	Trichloroethene	Not achieved	Decreasing at 90%	Decreasing
		cis-1,2-dichloroethene	Not achieved	Decreasing at 90%	Decreasing
		Vinyl chloride	Not achieved	Decreasing at 90%	Decreasing
		Benzene	Achieved	Decreasing at 90%	Decreasing
FW25	Downgradient 1,100 feet Overburden	Trichloroethene	Achieved	Stable	Stable
		cis-1,2-dichloroethene	Achieved	Stable	Stable
		Vinyl chloride	Achieved	Stable	Stable
		Benzene	Achieved	Stable	Stable

* This well no longer being monitored.

In addition to assessing the VOC concentration trends, Roux Associates used simple regression techniques to forecast future VOC concentrations based upon the past five years of monitoring data. Regression analysis was completed by using the Excel Spreadsheet Trendline feature implemented by matching the existing data with an exponential best-fit equation. While the regression technique does not permit the evaluation of the various factors that the 1996 predictive modeling may have included, it does intrinsically incorporate all the factors that have influenced the concentration trends over time. The major assumption in Roux Associates' regression analysis is that the past conditions that were in effect during the previous six years of monitoring will continue, including groundwater velocity and the geochemical and biodegradation potential of the aquifer.

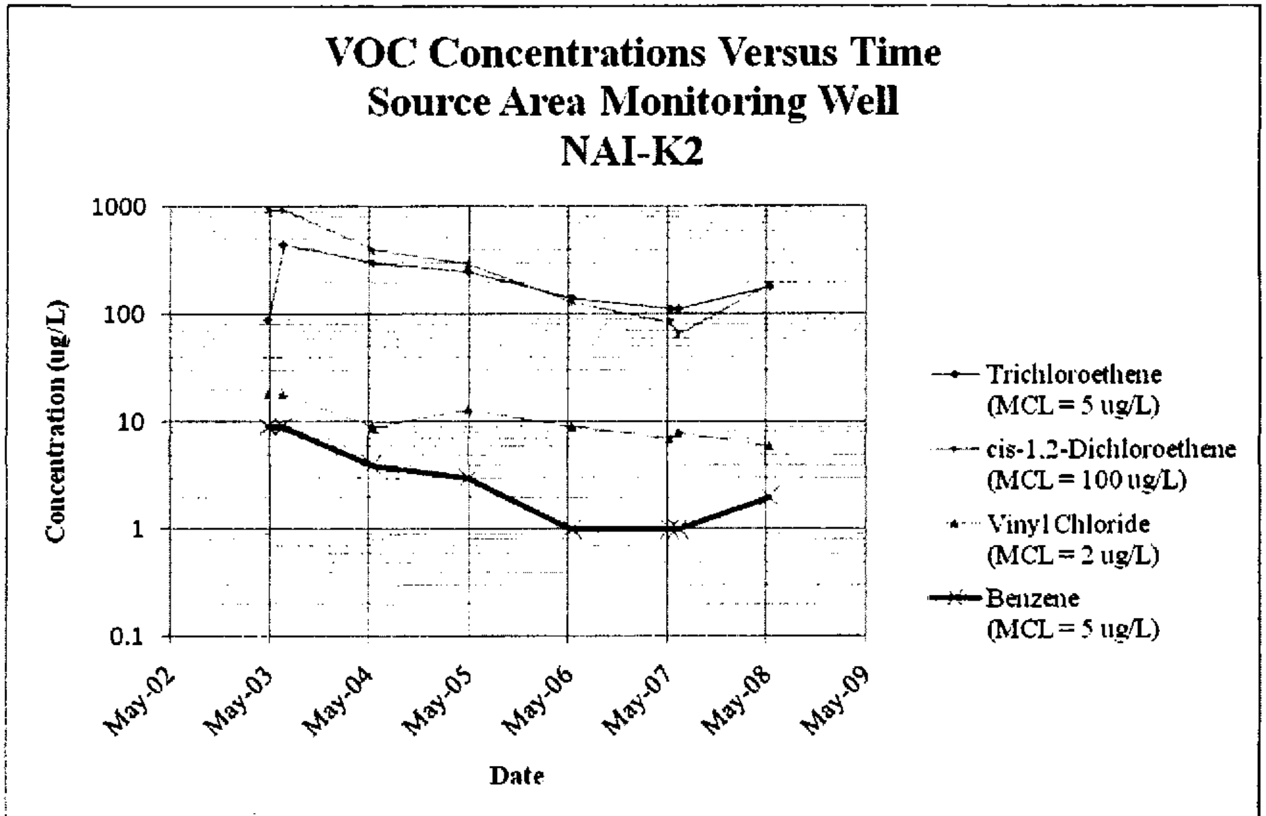
It should also be noted that few MNA parameters have been collected during the routine monitoring conducted during the past six years. As a result, it is not possible at this time to evaluate any changes in the geochemical and biodegradation potential of the aquifer that may have affected degradation rates and therefore time to achieve compliance.

A discussion of the trends and predicted attainment of MCLs for key VOCs (trichloroethene (TCE), cis-1,2-dichlorethene (1,2DCE), vinyl chloride , and benzene) in a number of monitoring wells is presented below.

NAI-K2

Monitoring well NAI-K2 is located in the source area and was destroyed during property redevelopment activities and replaced in June 2003. As illustrated in the following plot, only benzene concentrations are presently below the target MCL in this well. In addition, it should be noted that concentrations of cis - 1,2DCE had decreased below the MCL of 100 ug/L in 2007 but were measured above the MCL in 2008. TCE and vinyl chloride currently remain above the MCLs. The M-K analysis detected decreasing trends at a 90% confidence level for each of these compounds. In addition, visual inspection of the trends revealed a downward trend for each of the VOCs.

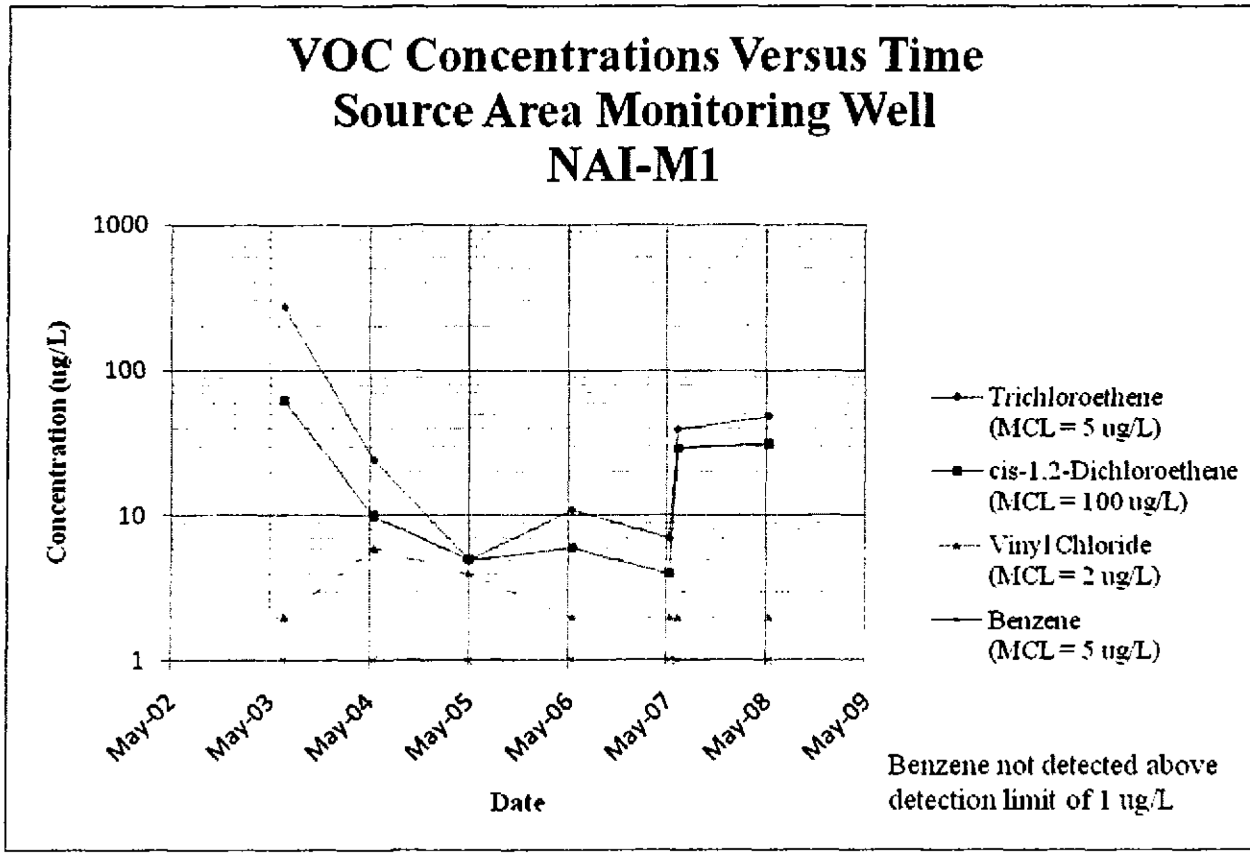
Based on simple regression analysis, TCE and vinyl chloride are predicted to meet MCLs in approximately 2037 and 2014, respectively. This is approximately 19 years beyond the prior model prediction date of 2018. As noted above, 1,2 DCE was observed below the target MCL during 2007 but recently increased to above the target concentration. Results of the regression analysis is included in Appendix E-A. As a result, it is possible that concentrations of 1,2DCE will decrease below the MCL during the next year. However, until additional data are collected, it is impossible to determine if the 2008 increase in concentrations are a short-term anomaly or a result of changing conditions.



NAI-M1

Monitoring well NAI-M1 is located in the source area and was destroyed during property redevelopment activities and replaced in June 2003. As illustrated in the following plot, only TCE concentrations are currently detected above the MCL. The M-K evaluation revealed stable trends for 1,2DCE and benzene (both currently below MCLs), decreasing trends for vinyl chloride (currently below MCLs) at a 90% confidence level and an increasing trend for TCE at an 80% confidence level. As illustrated in the flowing plot, TCE and 1,2DCE trends are nearly identical; however, it appears that the greater increase in TCE concentrations as compared to the increase in 1,2DCE concentrations observed during June 2007 resulted in the different M-K results. Visual inspection of the trend for the presented VOCs is either stable or downward. However, until additional data are collected, it is impossible to determine if the recent increase in TCE and 1,2DCE concentrations are a short term anomaly or a result of changing conditions.

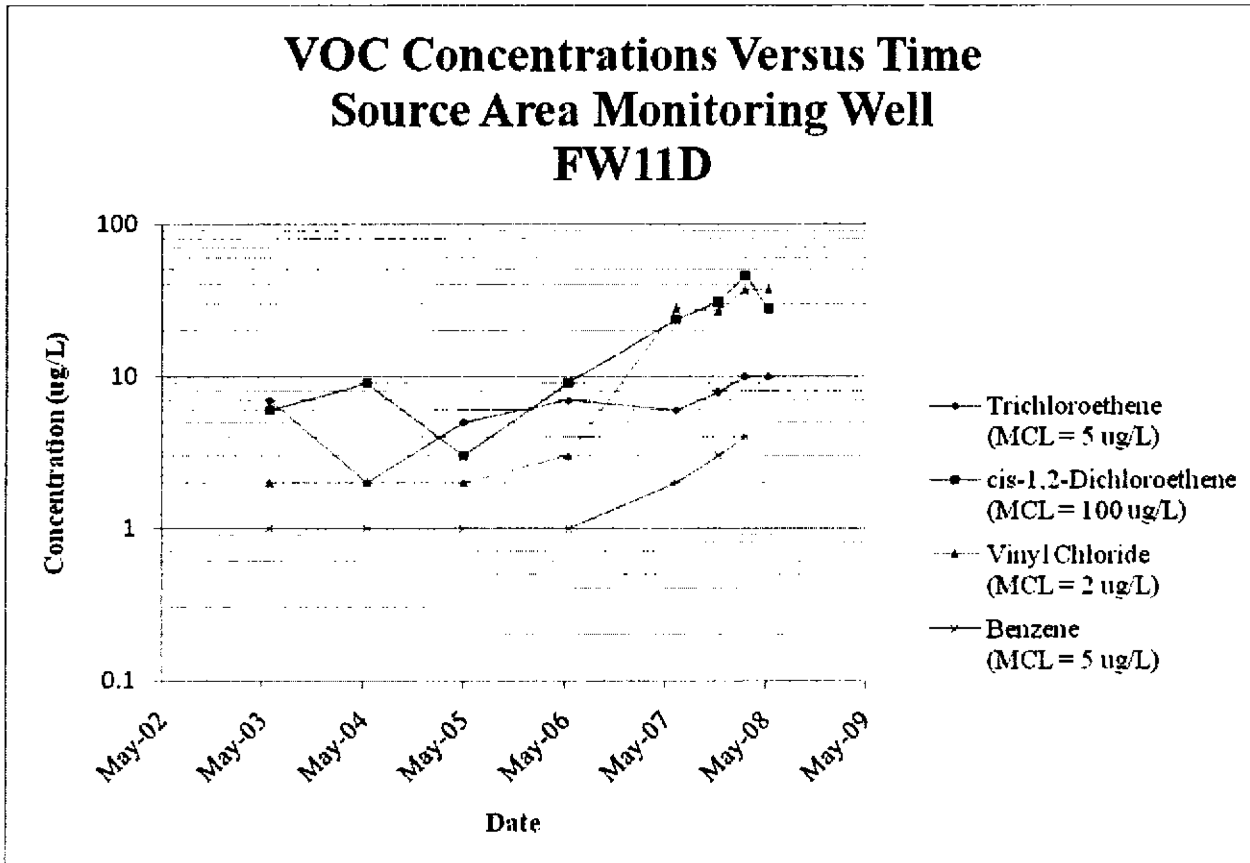
Although the two most recent samples indicate an increase in TCE concentrations (as well as 1,2DCE concentrations), a simple regression analysis suggests that TCE concentrations should decrease to below the MCL by approximately 2012; while 1,2 DCE concentrations are still below MCLs.



FW11D

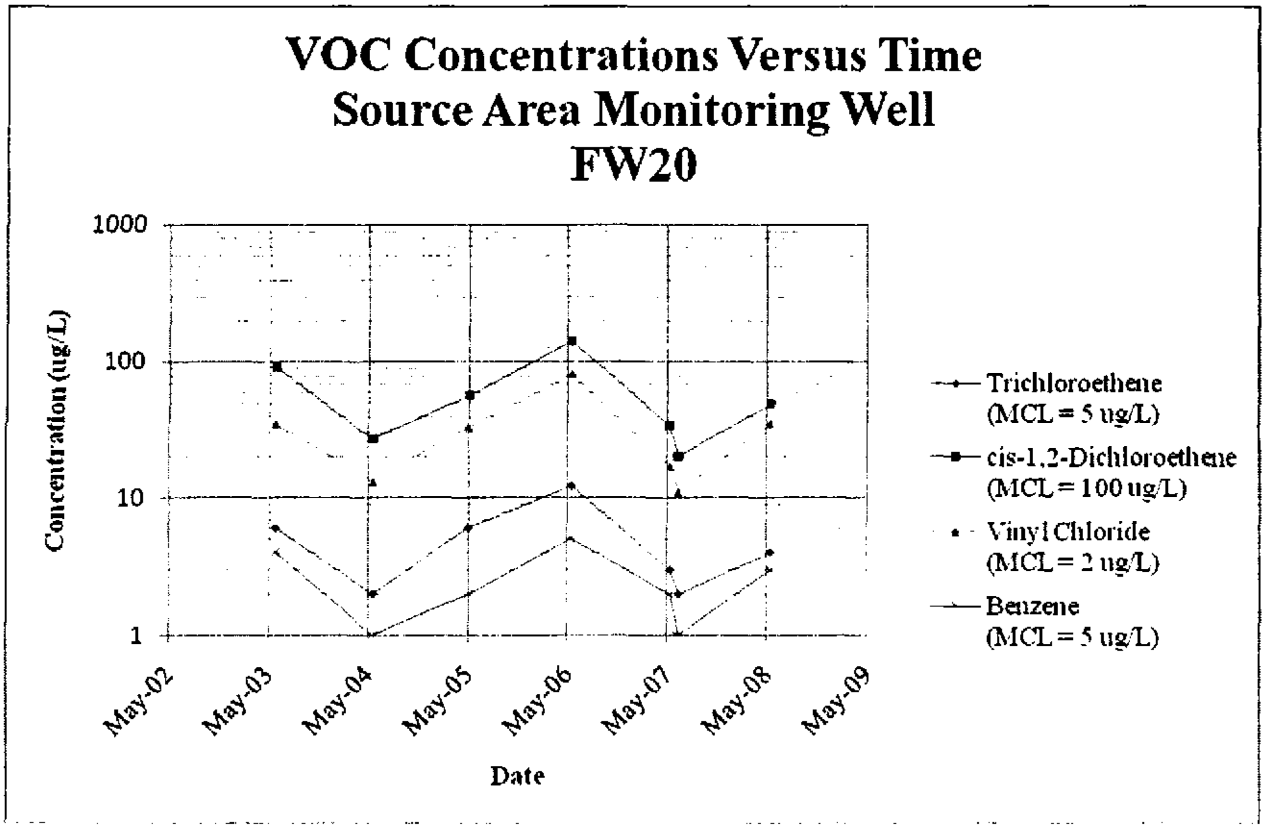
Monitoring well FW11D is located approximately 360 feet downgradient of the source area. As illustrated on the following plot, benzene and 1,2DCE are below MCLs. The M-K analysis detected increasing trends at 90% confidence levels for 1,2DCE, vinyl chloride and benzene and stable trends for TCE. Visual inspection of the trends revealed an increasing downward trend for each of the VOCs. Because of the increasing or stable trends, the date of compliance for TCE and vinyl chloride cannot be predicted. In addition, it should be noted that, based on currently increasing trends, both benzene and 1,2 DCE may also exceed their MCL standards in the future.

The cause of the increasing trend is unknown. However, disturbances to the source area by the redevelopment of the property in 2002-2003 may have affected transport conditions as no new releases of VOCs are known to have occurred at the Site. This well area needs further evaluation



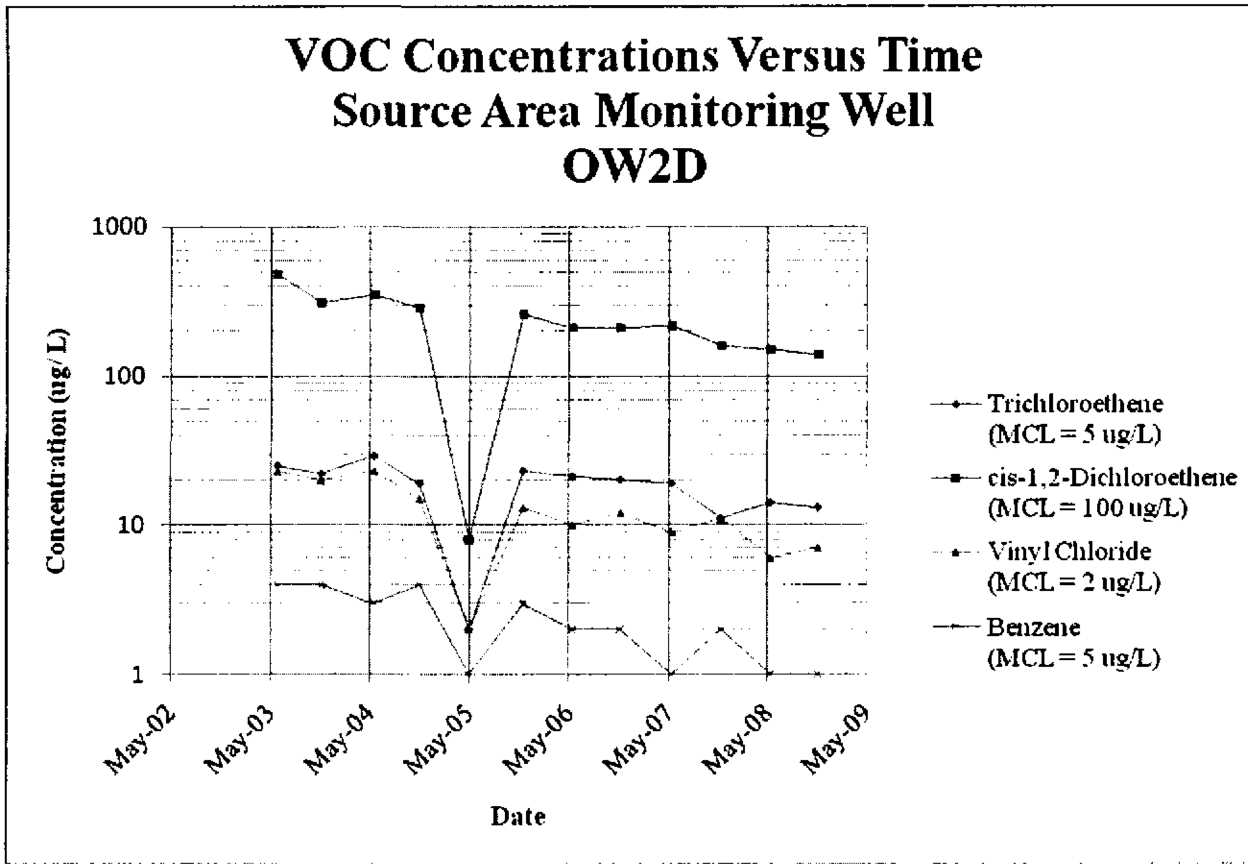
FW20

Monitoring well FW20 is located approximately 360 feet downgradient of the source area. As illustrated on the following plot, vinyl chloride and 1,2 DCA currently exceeds the MCL. While the M-K analysis did not detect any significant increasing or decreasing trends, the evaluation did reveal stable plumes. Visual inspection of the trend for the presented VOCs is downward or stable. Although the most recent sample results indicate an increase in VOC concentrations, a simple regression analysis suggests that vinyl chloride concentrations should decrease to below the MCL in greater than 20 years beyond the 2018 previous model prediction.



OW2D

Monitoring well OW2D is located approximately 525 feet downgradient of the source area. As illustrated on the following plot, only benzene is currently below the MCL. The M-K evaluation detected significant decreasing trends at the 90% confidence level for each of the four compounds. Decreasing trends for each of the compounds were also revealed in the visual analysis of the data. Based on simple regression analysis, TCE, 1,2DCE, and vinyl chloride are predicted to meet MCLs in approximately 2021, 2010 and 2015, respectively.



E-1.3 Conclusions and Recommendations

Concentrations of one or more VOCs in six out of the eight wells routinely monitored currently exceed MCLs. However, in all but one location, FW11D, VOC concentrations are decreasing at various rates. Predictive fate and transport modeling completed in 1996 concluded that VOC concentrations in each of these wells would decrease to below MCLs within 15 years (2018)following the cessation of groundwater extraction. This goal has been achieved or, based on current trends, are predicted to be achieved for all but TCE at NAI-K2 and vinyl chloride at FW20. These wells are near the source area. Further evaluation is needed.

At this time, the cause of the increasing VOC concentration trend in FW11D is unknown and must continue to be monitored and further investigated. Based on the increasing trends, a prediction as to when TCE and vinyl chloride will achieve compliance with the MCLs at this location is not possible. Furthermore, 1,2DCE and benzene, which are currently below MCLs, may increase in concentrations above the MCLs in the future. No new releases of VOCs are known to have occurred at the Site. The increasing concentrations trends may be the result of disturbances to the source area by the redevelopment of the property in 2002.

It should also be noted that only a few MNA parameters have been routinely monitored during the past five years. As a result, it is not possible to evaluate whether changes in the geochemical and biodegradation potential of the aquifer have changed and, thus, altered the time predicted to reduce concentrations to MCLs.

Based upon this assessment, the following recommendations are proposed:

- Increase groundwater monitoring frequency to twice per year for monitoring wells NAI-K2, FW11D, and FW20; More study is needed in addition to increasing sample frequency. May add new wells to sample or new wells to program.
- Continue to monitor DVE3, DVE7, NAI-M1,OW2D, and FW25 at the current frequency; and
- Consider testing for additional MNA parameters including nitrate, sulfate, ferrous iron, total iron, chloride, and methane.
- Update Groundwater Model to reflect site conditions.

E-2 1,4-Dioxane

E-2.1 Introduction

As a result of changes in analytical requirements of the NHDES Waste Management Division in January 2008, the PRPs began testing for 1,4-dioxane in May 2008. This compound had not been investigated as part of any of the investigations performed historically by the EPA or the PRPs.

1,4-Dioxane is an organic chemical that has historically been used as a stabilizer for chlorinated degreasing solvents such as 1,1,1-trichloroethane (TCA). Solvent stabilizers such as 1,4-dioxane are intended to scavenge the hydrochloric acid produced by the hydrolysis of chlorinated solvents and prevent the degradation of the solvent's properties.

The physical and chemical properties of 1,4-dioxane make it highly mobile in groundwater. 1,4-Dioxane is miscible in water and has a low organic carbon partitioning coefficient which minimizes its tendency to sorb onto soil. Furthermore, its low vapor pressure and miscibility indicate that 1,4-dioxane prefers to remain in water and does not vaporize into soil gas or indoor air. 1,4-Dioxane is resistant to both anaerobic and aerobic biodegradation and does not readily hydrolyze.

According to the EPA, 1,4-dioxane is a probable carcinogen though no Maximum Contaminant Level has been promulgated by the EPA. EPA Regions 3, 6, and 9 have established a guideline of 6.1 ug/l. Other states in EPA Region with guideline concentrations for 1,4-dioxane include Massachusetts (3 ug/l), Rhode Island (6.1 ug/l), Connecticut and Vermont (20 ug/l) and Maine (32 ug/l). NHDES has established an Ambient Groundwater Quality Standard (AGQS) for 1,4-dioxane of 3 ug/l.

E-2.2 2008 Testing Results

In May 2008, the PRPs collected 14 groundwater samples, two surface water samples, and one tap water sample in conformance with the Groundwater Management Permit (GMP) for the Site. These samples were also tested for 1,4-dioxane by Eastern Analytical in accordance with EPA Method 8260B SIM. The results of this sampling round are reported in Table D-2. Please also refer to Figure A which indicates the wells where 1,4-dioxane was detected.

1,4-Dioxane was detected in nine groundwater samples and the two surface water samples. However, the laboratory that performed the testing did not pass Performance Evaluation (PE) samples provided by EPA and intended to demonstrate proficiency in testing for 1,4-dioxane. Using EPA data validation protocol, therefore, the reported detected concentrations from the May 2008 samples are considered to be estimated for 1,4-dioxane and the results of samples where 1,4-dioxane was not detected are rejected.

In November 2008, in accordance with the monitoring requirements of the GMP, three groundwater and two surface water samples were collected. Two of the groundwater samples were collected from the furthest most downgradient GMP monitoring wells (FW28D and ERT04). The third groundwater sample was collected from monitoring well OW2D which is located downgradient of the former source area. These samples were tested for 1,4-dioxane at the EPA laboratory in Chelmsford, Massachusetts in accordance with EPA Region I SOP, EIASOP-VOADIOX4. The results of this sampling round are also reported in Table D-2.

Table E-2 Reported 1,4-Dioxane Concentrations in ug/L

Sampling Location	May 2008	November 2008
OW2D / OW2D Dup	200J / 220J	350
DVE7	2J	NT
NAIK2	1J	NT
DVE3	< 1R	NT
NAIM1	< 1R	NT
FW20	140J	NT
SW1	1J	< 2
SW2	2J	< 2

ERT04	< 1R	< 2
FW25	< 1R	NT
FW28D	< 1R	< 2
Tap In Kitchen	< 1R	NT
LGSW	57J	NT
ERT01	31J	NT
FW21D	10J	NT
FW11D	450J	NT
Trip Blank	< 1R	NT

General Notes:
1. "<" indicates that 1,4-dioxane was not detected in the sample at a concentration less than the *laboratory reporting limit.*
2. "J" indicates that the reported concentration is estimated based upon data validation criteria.
3. "R" indicates that the reported result is rejected based upon data validation criteria.
4. "NT" indicates that the sample was not tested during this sampling round.

No reportable concentrations of 1,4-dioxane were detected in the groundwater in the GMZ boundary monitoring wells in November 2008. These results were consistent with the rejected results reported from the samples collected in May 2008. A concentration of 350 ug/l of 1,4-dioxane was reported for the groundwater from monitoring well OW2D. 1,4-dioxane was detected at 200ug/l and 220 ug/l in duplicate groundwater samples collected from monitoring well OW2D in May 2008.

E-2.3 Conclusions and Recommendations

As a result of the testing performed to date, 1,4-dioxane is considered a contaminant of concern at the Site and additional assessment of its extent is warranted. No risk to public health or the environment appears to be posed by 1,4-dioxane at this time since a Groundwater Management Permit is in place and residents living within the Groundwater Management Zone are serviced by municipal water. Therefore, the suggested assessment activities include:

1. Assessment of the adequacy of the existing groundwater monitoring well network to determine the extent of 1,4-dioxane at the Site and affirm that 1,4-dioxane does not extend beyond the current Groundwater Management Zone (GMZ).
2. Sample private water supply wells along Ross Drive to the south to demonstrate that 1,4-dioxane has not extended beyond the GMZ boundary.
3. Determine whether private water supply wells exist to the west, beyond Capital Hill Drive and, if present, sample a limited number of these wells.

A work plan to assess each of these areas should be prepared and submitted to EPA by June 1, 2009.

Appendix F
Updated Conceptual Site Model

Tinkham Garage
Londonderry, New Hampshire
January 2009

Introduction

An updated Conceptual Site Model (CSM) has been developed based upon the results of investigations, remedial actions, and monitoring that has occurred at the Tinkham Garage site (the Site) since 1981. The investigations performed have included the sampling and testing of soil, groundwater from the overburden and bedrock aquifers, surface water, and sediment. Remedial actions have included installation of a public water supply line to the Site area, soil remediation, groundwater extraction, and monitored natural attenuation. Finally, routine monitoring of concentrations of volatile organic compounds (VOCs) in groundwater and surface water has occurred since 1994.

This CSM is intended to communicate the understanding of the natural and contaminant conditions at the Site including the sources of contamination, hydrogeology, contaminant migration, and exposure pathways and potential receptors. This CSM also summarizes the impacts of remedial actions taken to date at the Site. Figure F-1 is intended to pictorially depict the CSM for the Site.

Sources of Contamination

Concerns regarding contamination at the Site date back to 1978 when it was determined that truck washings and sludge were being discharged to the ground surface behind the Tinkham Garage. Further investigations were initiated by the USEPA in 1981 that determined that soil, groundwater used for potable water supplies, and surface water were contaminated by VOCs.[2] Further USEPA investigations through 1986 concluded that the Site was contaminated with VOCs and extractable organic compounds in groundwater in the overburden and bedrock aquifers, in surface water, and in soils located in the field behind Tinkham Garage and in the Woodland Village Condominium complex area. Specifically, the four contamination source areas were identified as the field immediately south of Tinkham Garage and the swale area, soil

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[2] The 1981 EPA investigations resulted in the termination of private water supply wells Londonderry Green Apartments (presently Woodland Village Condominiums) and residential wells along Mercury and McAllister Drives.

pile, and domestic waste leaching fields associated with the Woodland Village Condominium complex.

VOCs are the predominant contaminants at the Site and were determined to present the risk to public health and welfare and the environment at the Site.

Hydrogeology

VOCs have come to be in two aquifers at the Site: the overburden aquifer; and the bedrock aquifer.

Overburden groundwater is flowing in a south/southeasterly direction and is ultimately discharging to the wetlands to the south/southeast of the Site or into unnamed streams and tributaries that transect the Site. In the source area behind the Tinkham Garage, overburden groundwater can potentially discharge to the surrounding wetland or may be influenced by downward gradients thus resulting in contaminant migration into the underlying bedrock. It is likely that the VOC contaminated overburden groundwater provides a continuing source which leaches to the bedrock aquifer. Figure E-1depicts the CSM for the overburden aquifer.

The groundwater flow in bedrock aquifer appears to take place largely in fracture zones which have a northeast/southwest orientation based upon data gathered from two pump tests performed at the Site. Furthermore, data indicate that the bedrock aquifer groundwater discharges to the unnamed tributary in the vicinity of the Woodland Village Condominium complex from both east and west of the tributary. In addition to discharges to the tributary, there exist a number of artesian bedrock wells along Mercury Drive and within the Woodland Village Condominium complex. Groundwater discharging to the surface from these wells migrates to the unnamed tributary via surface flow.

Migration

VOCs migrate in groundwater at the Site in both the overburden and bedrock aquifers.

In the overburden, the migration is more limited in extent and generally extends from the source area behind Tinkham Garage to the stream and wetlands less than 600 feet to the south/southeast. In the source area behind Tinkham Garage, downward vertical gradients have also resulted in migration of VOCs vertically downward into the bedrock aquifer.

VOC migration in the bedrock is primarily dictated by the water bearing fractures that are oriented in a northeast/southwest direction. This orientation and the previous use of the bedrock aquifer for domestic supplies have resulted in a more extensive distribution of VOCs in the bedrock groundwater. Based upon the results of investigations and monitoring, VOCs in bedrock groundwater extends from Tinkham Garage to the Woodland Village Condominium complex (approximately 3,000 feet to the southwest).

To date, based upon the existing data, VOC-impacted groundwater is believed to be limited to the Site. It is possible that VOC-impacted groundwater could migrate in secondary fractures beyond the current Site boundaries. However, investigations and monitoring to date have shown no evidence of migration beyond the Site boundaries.

Exposure pathways and Potential Receptors

USEPA determined that the greatest potential risk presented by the Site is from exposure to VOC contaminated groundwater. The primary potential receptors are residents who used the bedrock aquifer as the primary source of drinking water prior to 1983. Since 1983, these exposures were eliminated by the installation of a permanent water supply line and the implementation of a Groundwater Management Zone for the Site.

Residents along Gilcreast and Ross Drives as well as the Tinkham Realty Company building continue to utilize the bedrock aquifer for drinking water purposes. While no VOCs from the Site have been detected to date in monitoring wells between the Site and these receptors to date, these residents remain potential receptors.

Contaminants detected in surface water and associated sediments on the Site do not present a significant risk to public health and welfare and the environment.

Remediation

Numerous remedial actions have been implemented to mitigate potential exposures to VOC contamination and reduce VOC concentrations in soil and groundwater at the Site.

Beginning in January 1983, the drinking water supply well servicing Londonderry Green apartments (presently Woodland Village Condominiums) and residential wells along Mercury and McAllister Drives were taken out of service and replaced with a Permanent water line in November 1983. This remedial action was followed by soil remediation activities that reduced VOC soil contamination to less than the required standard in 1995. Since that time, groundwater remediation has been ongoing and has resulted in reductions of concentrations from a maximum total VOCs concentration of approximately 32,000 ug/l to a high in 2008 of 606 ug/l.

Changes in CSM

Since the last Five Year Review, no changes in the CSM have occurred. However, as a result of changes in NHDES regulations, a new contaminant of concern, 1,4-dioxane, has been added to the monitoring program for the Site. In November 2008, the presence of 1,4-dioxane was confirmed. Further assessment is required to determine whether this contaminant changes the CSM.